

ROADS AND STREETS

JULY 1950



More mixing, less fixing with drum on TIMKEN® bearings

THIS Rex 4 1/2 yd. Hi-discharge Moto-Mixer keeps its nose to the grindstone to speed your construction jobs. No time-wasting bearing breakdowns to worry about.

It's equipped with Timken® tapered roller bearings at four vital points—mixing drum front main bearing, drum rollers, transmission clutch shaft, and transmission final drive sprocket shaft.

Timken bearings have the tapered construction that takes the drum's radial, thrust, and combination loads. They have line contact between rollers and races to carry the heaviest loads the drum can dish out. They can be expected to last the life of the mixer because they are: (1) engineered for the job, (2) made of Timken fine alloy steel for extra toughness and wear-resistance, and (3) manufactured to amazing limits of accuracy.

Timken bearings keep moving parts in rigid alignment, re-

duce wear and maintenance costs. They permit tighter closures to retain lubricant better and cut lubrication time. In heavy duty service like this, they reduce friction more than any other bearing.

Make sure the machines you build or buy have these Timken bearing advantages. Always see to it that your bearings are stamped with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, O. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



JOB PROVED... *10-Ton "EUC"*

Emerging from a tunnel which leads to an underground loading area, this Model UD starts up the haul road to the crushing plant at C. A. Langford Stone Company in Tennessee.



The Acme Construction Company uses this 10-Ton Rear-Dump on a highway construction job at Matamoras, W. Va. The "Euc" is loaded with earth and shale by a 1 1/4 cu. yd. shovel.



Powered by a 125 h.p. diesel engine, the Model UD has a top speed of 35.7 m.p.h. and plenty of power for steep grades. The 840' haul road at the C. A. Langford quarry near Cookeville, Tenn., has a maximum grade of 10%.



High dumping angle and fast-acting Euclid hoist assure quick dumping. Here the "Euc" dumps a capacity load of limestone into crusher at the H. & R. Stone Company quarry at Ridgeville, Ind.

Built for jobs requiring a smaller capacity hauling unit for heavy off-the-highway service, the 10-Ton Rear-Dump Euclid has made good ...hauling more tons at less cost in mines, quarries, construction and industrial work. Owners like the Model UD because it is easy to handle ...has ample power and speed ... and can do a wide range of jobs economically.

You can depend on the 10-Ton Euclid for greater job profits and long service life. Your Euclid distributor will be glad to discuss your job requirements... write or call him today for information on the Model UD Rear-Dump or the complete line of Euclid earth moving equipment.

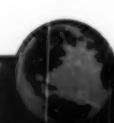
THE EUCLID ROAD MACHINERY CO.
CLEVELAND 17, OHIO

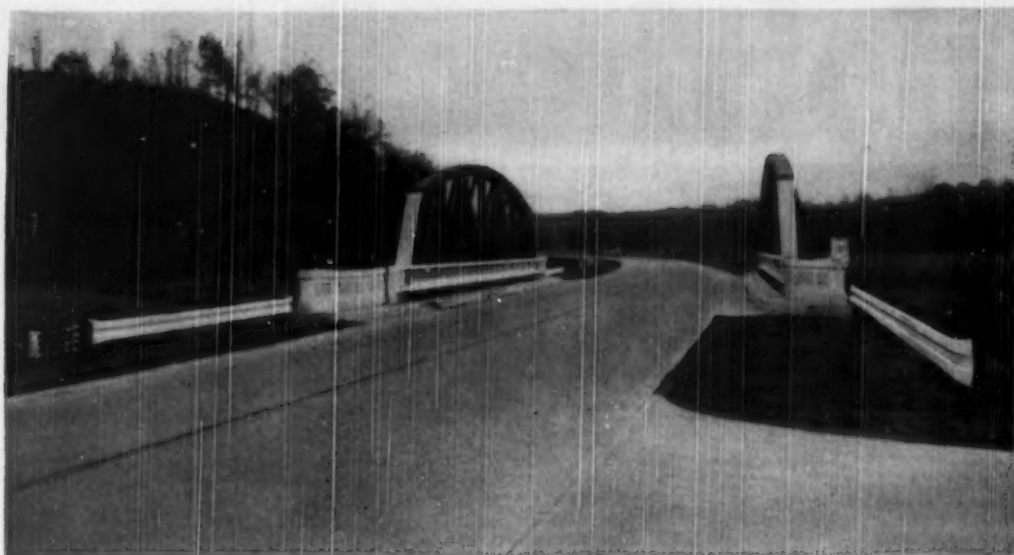


EUCLID



Move the Earth





Bethlehem Safety-Beam Guard Rail at bridge approach on Route 37, between Martinsville and Bloomington, Indiana. Contractors: William D. Vogel, Indianapolis, and Rieth Riley Construction Co., Goshen, Ind.; Guard Rail Erector: James H. Drew Corp., Indianapolis.

For Extra Protection Use Safety-Beam

To provide extra protection for motorists, use Bethlehem Safety-Beam Guard Rail at sharp turns, embankments, bridge approaches and other dangerous locations along highways.

Bethlehem Safety-Beam Guard Rail provides maximum safety at highway danger points for two reasons: (1) strength, and (2) ability to absorb impact. Safety-Beam consists of heavy sections of steel plates, bolted together on steel posts to form a continuous, impact-absorbing beam. When a vehicle strikes Safety-Beam, impact is absorbed by several posts, making it virtually impossible to crash through the rail.

Safety-Beam is easily visible at all hours. It can be installed quickly, too, even by unskilled labor, for it fastens to steel or wood posts with but one bolt. No

end anchor rods, special tools or complicated adjustments are required. Safety-Beam regularly comes in easy-to-handle 12 ft, 6 in. lengths, but is also furnished in longer lengths.

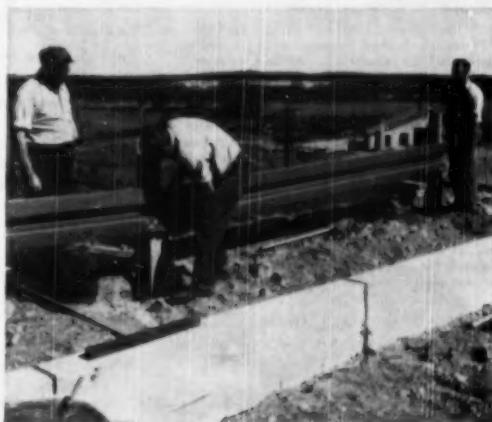
Our Folder 545 gives standard details and assembly plans for Safety-Beam Guard Rail. For your copy, contact the nearest Bethlehem sales office. Or get in touch with us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

Dowel Units • Reinforcing Bars • Bar Mats
Guard Rail • Guard Rail Posts • Wire Rope and Strand
Hollow Drill Steel • Spikes • Bolts and Nuts
Pipe • Timber Bridge Hardware • Tie-Rods
Shovel- and H-Piling • Fabricated Structural Steel



Fastening Safety-Beam Guard Rail to Bethlehem steel post on Route 3 by-pass, in vicinity of Concord, N. H. Contractor: Peter Salvucci, Waltham, Mass.; Guard Rail Erector: Costantino Bros., Inc., Providence, R. I.

When writing advertisers please mention **ROADS AND STREETS**, July, 1950

ROADS AND STREETS

July, 1950

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Vol. 93

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No. 7

Roads and Streets represents 88 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

E. S. GILLETTE, Publisher



HALBERT P. GILLETTE, Editor-in-Chief

Coming Articles

Snow Removal and Ice Control

Hot weather is the time to think about this subject. August R and S will have several articles.

County Road Problems

How an Illinois county consolidated its local road districts in the interest of greater efficiency, and some of the equipment and methods used to make road dollars go farther.

Road Modernization

Report on unusual methods used in Wisconsin for very severe pavement conditions, involving p. c. concrete second-story slab and heavy asphaltic concrete blanket.

Equipment Maintenance

Hardfacing—does your shop crew employ this money-saving idea to the limit? Proper procedure? A resume of recommended practice coming in an early issue.

Municipal

What New Street Problems from the Housing Boom? Watch for a symposium by several top municipal authorities from coast to coast. One tip—trend is to heavier suburban street pavements. They're cheaper to maintain.

Earthmoving

Case articles coming from some of outstanding 1950 projects.

Also

Articles on bridge foundations . . . Emergency bridge repairs . . . Airfield extension problems . . . Traffic lights: how installed and administered . . . A County's method of widening one-lane pavements . . . Automatic batching equipment on a mid-west paving job . . . AND, special articles on methods and problems seen on the Pennsylvania and New Jersey turnpikes.

Contractors and the superintendents . . . officials and engineers . . . something for all in each issue of "Roads and Streets". Watch for your next copy. Practical "how it was done" articles invited from readers.

HAROLD J. McKEEVER, Editorial Director
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S. A. Phillips, Field Editor
H. K. Glidden, Contributing Editor

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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B.F. Goodrich



BFG users report: Continued savings —thanks to double bruise protection

B. F. GOODRICH *Universals* were reported by one operator to be in good condition after daily quarry service for over 21 months. Another operator reports over 4500 service hours from *Universals* against only 1600 hours from another make in identical service. Still another report told of tires that were still "young" at 3200 hours and probably good for thousands more. These actual user reports spotlight the great difference between various makes of off-the-road tires.

When results are measured, BFG tires always stand high. There are many reasons for the continuing top performance of B. F. Goodrich tires. For example, notice the tread on the

Universals in the picture above. It's designed to give traction both ways. More than that, it is made of specially compounded rubber . . . armor against sharp rocks and other tire killers.

Also, BFG tires have double bruise protection in the form of a *double nylon shock shield* . . . layers of nylon cord built between the tread and the body plies. Under impact, the strong, elastic nylon shields the cord body. And there are two shields for double protection!

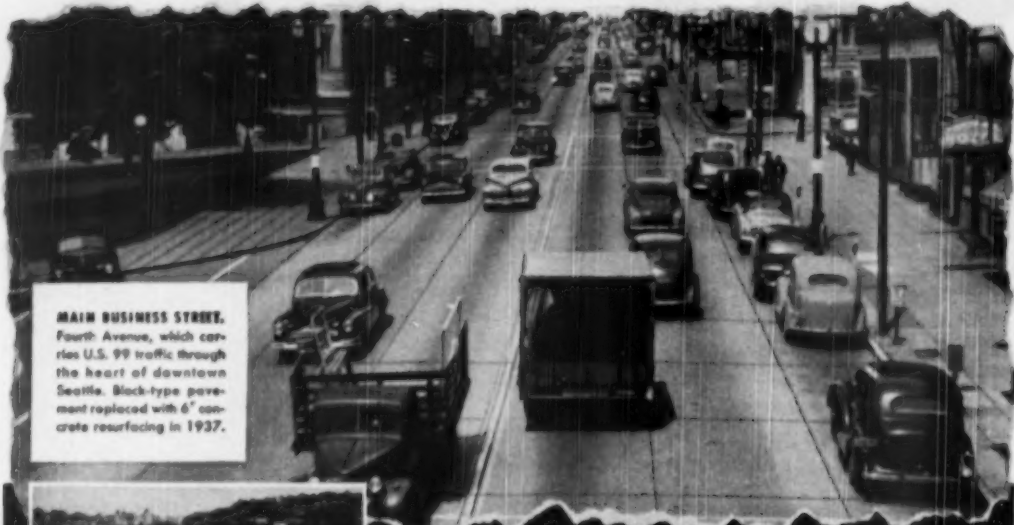
Only B. F. Goodrich gives you the added protection of the nylon shock shield; the added savings from (1) longer tire life (2) increased bruise resistance (3) less danger of tread separation (4) more recappable tires. Nylon

shock shield costs no extra—you pay no premium.

There's a specially designed "BFG off-the-road tire for every need. See your B. F. Goodrich dealer or call The B. F. Goodrich Company, Akron, Ohio.




*Typical example: New ALL-NYLON tire for tough construction projects, quarry work, strip mining, etc. In all tests not a single tire blew out, not one flex break occurred!



MAIN BUSINESS STREET. Fourth Avenue, which carries U.S. 99 traffic through the heart of downtown Seattle. Black-type pavement replaced with 6" concrete resurfacing in 1937.

In Seattle maintenance costs
are lowest on **CONCRETE STREETS**



PRINCIPAL ARTERIAL STREET. Aurora Avenue, built in 1933, provides 3 traffic lanes in each direction for the unobstructed movement of heavy and high-speed traffic (1) traveling to and from outlying residential districts and (2) entering and leaving Seattle over U.S. 99, the Pacific Highway.


SEATTLE HAS MORE than 11,000,000 sq. yd. of concrete streets —more sq. yd. per capita than any other city in America with more than 100,000 population. There's a reason:

Street maintenance records for a 25-year period beginning with 1924 show that the average annual cost of maintaining portland cement concrete streets was only \$.00098 per sq. yd. per year—less than 1/10th of one cent. The average annual cost of maintaining the two other types of pavement was \$.00563 and \$.00682 per sq. yd. respectively—3½ to 7 times as much!

Twenty-five years ago only 30% of Seattle's paved street yardage was concrete, but its long life, low maintenance cost and many other advantages resulted in steadily increased use. Today concrete accounts for 69% of the city's paved street yardage. Despite this preponderance of concrete, Seattle taxpayers have paid 72½% less to maintain the concrete pavements than to maintain the two other types of pavement combined during the 25-year period.

The experience which made concrete the preferred pavement in Seattle has been repeated in hundreds of cities. Concrete usually costs less to build than other pavements of equal load-carrying capacity, it costs less to maintain and it lasts longer. These three factors result in **low annual cost**, which pleases taxpayers.

For more information about how to build **low-annual-cost** pavements, write for free booklet, "Design of Concrete Pavements for Municipal Streets." Distributed only in the United States and Canada.



RESIDENTIAL STREET. 22nd Street, N.W. Renowned for the first recorded use of dummy groove contraction joint. This street was paved in 1921.



RESIDENTIAL STREET. West Viewmont Way. Paved with portland cement concrete in 1948.

PORTLAND CEMENT ASSOCIATION

DEPT. 7-28; 33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

BETTER BUY... NORTHWEST!

Here is but a part of the list of advantages that Northwest has for you — a list of advantages that puts Northwest far in the lead from the stand point of low upkeep cost, ease of maintenance and high output.

They deliver the satisfaction that makes the Northwest the best for the heart of the job. Plan now to have one. Let us tell you more about why one out of every three Northwests sold is a repeat order.

● **Simplicity of Design**... Means easy, low-cost maintenance
● **Cast Steel Bases with Cast Steel Machinery Side Frames**... Plenty of strength — maintains shaft alignment
● **Easy Convertibility**... Makes possible quick machine changes for any class of work

● **Ball or Roller Bearings on All High Speed Shafts**... Minimum loss of power to friction
● **"Feather-Touch" Clutch Control**... Ease of operation without pumps, valves or tubing. Your Northwest can't be shut down because of control failure

● **Helical Gear Drive**... There is no finer power take off
● **Uniform Pressure Spring Clutches**... Trouble-free — fewer adjustments — smoother operation

● **Cushion Clutch**... Eliminates the effect of shock overload to parts under power
● **Northwest Dual Independent Shovel Crowd**... Utilizes force of other independent crowd shovels waste

● **Positive Traction** while turning as well as when going straight ahead gives the larger Northwest the ability to travel where other types of crawlers have difficulty.

NORTHWEST ENGINEERING CO.
1506 Field Bldg., 133 South LaSalle St.
Chicago 3, Illinois

You can't afford anything but the best in the heart of the job. Specify a proved **Rock Shovel** and you'll never have to worry about any kind of digging.

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS



Only Adams

gives you this exclusive combination of advantages

1 Overlapping Forward Speeds . . . Flexible working range speeds work — increases output—provides high transport speeds.

2 Wide Range of Blade Positions Without Mechanical Adjustments . . . Saves time in adapting machine to needed cuts.

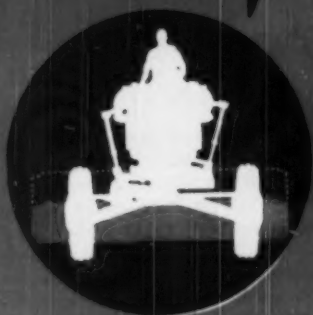
3 **POSITIVE-ACTION MECHANICAL CONTROLS**

4 Ample, Operating Clearances . . . Quick, easy adaption to work . . . Operator comfort, convenience, efficiency.

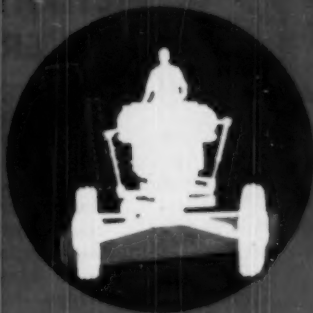
5 Fast, Easy Servicing Plus World-Wide Dealer Service . . . Saves time and money.



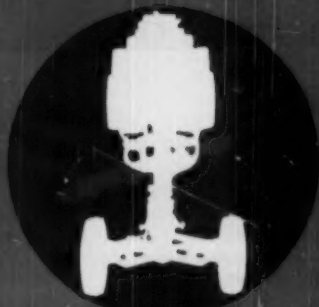
Positive Action Mechanical Controls



Positive, Automatic Blade Adjustment



Free Blade Movement Without Mechanical Adjustments



Blade Angle Can Be Changed With Blade Loaded

The Adams mechanical control system offers a number of outstanding advantages that contribute importantly to fast, smooth, low-cost grading operations:

- Revolving gears always move positively and at uniform speed—insure positive, accurate blade adjustments of any kind, at all times.
- Extent of blade movement is not restricted as with hydraulic rams—blade moves freely from beneath grader to bank cuts, without mechanical adjustments.
- Controls are backed by full h.p. of grader

engine, making it possible to change angle of blade and direction of material delivery with blade loaded. This is highly important on grade balancing work.

- Geared mechanical steering provides the same natural feel and control found in motor vehicles—steering is always safe, sure, easy.

This is but one of the exclusive combination of advantages that makes Adams Motor Graders your best buy—all ways. See your local Adams dealer for complete information.

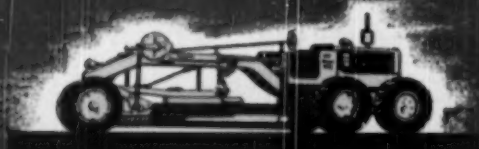
A. S. ADAMS MANUFACTURING COMPANY • INDIANAPOLIS, INDIANA

*Make your next
motor grader an*

Adams

Buy balanced

FOR MORE WORK



**SPEED
WEIGHT
POWER**

THE OWNER of the "Cat" No. 212 Grader shown here has a unique problem. "Can't keep operators away from the rig," says D. W. Klock, vice president of the Klock Construction Company, Amarillo, Texas. "This Motor Grader is so fast, maneuverable and well balanced, the boys *all* want to run it!"

Balance is the secret of "Cat" Graders' popularity with owner and operator alike. "Caterpillar" builds each Motor Grader from the ground up as an individual unit. The correct weight, plus the right horsepower, plus rated work speed—these things add up to *balanced* machines that solve your job problems at lower cost.

Informed buyers are finding that *assembled* motor graders are often poorly balanced. It stands to reason that when one engine or one frame is used for more than one model, the best use cannot be made of weight and power. But balanced "Cat" rigs are neither muscle-bound nor jumpy on the job. Their matching power cuts costs through superior performance and longer service life.

There's a size "Cat" Motor Grader for every type of work—with the stamina, punch and balance to do a particular job best. And don't forget what world-famous "Caterpillar" dealer service means in keeping equipment on the job—cutting down-time to the bone. Ask your "Caterpillar" dealer to show you his Motor Graders' bonus features—from tough blades with the maneuverability of a boarding-house reach, to "Hi-Electro" hardened final drive gears built to last.



LOOK UNDER THE HIDE

Fuel pumps are "Caterpillar"-designed and "Caterpillar"-built. Made of the cleanest high-chromium, high-carbon alloy steel obtainable, the pump plungers and barrels are diamond lapped. Pumps are heat-treated to maximum hardness to give users thousands of hours of trouble-free economical service. There is an individual pump for each cylinder. Pumps are adjustment-free and completely interchangeable. Look under the hide for quality—it doesn't show on the outside, it shows up in performance.

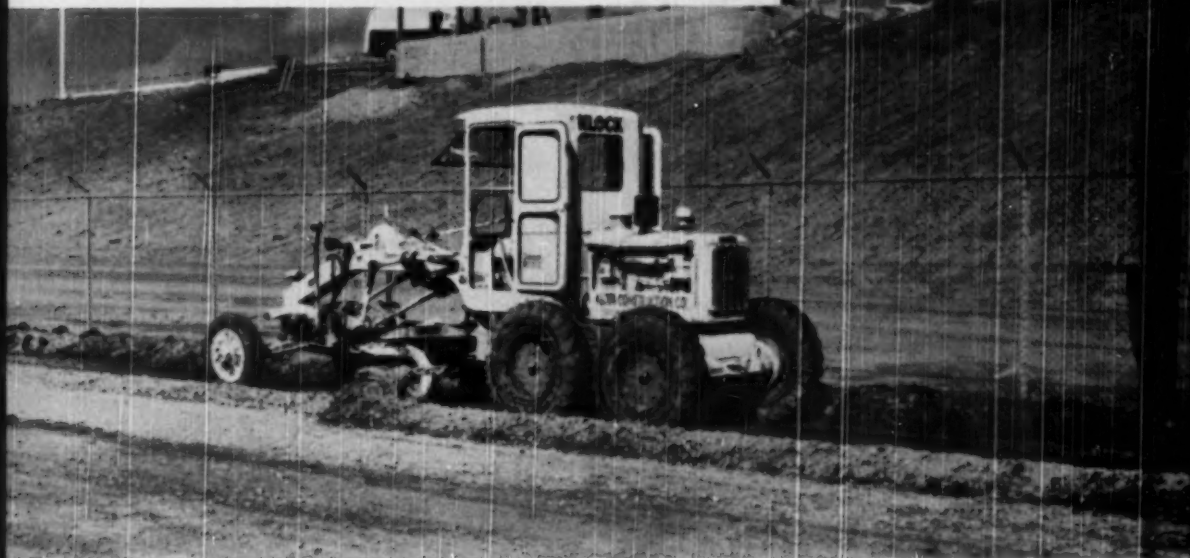
CATERPILLAR

320, 0-8, 047, 049

"Cat" graders

AT LESS COST

Here's the Klock Construction Company's "Cat" No. 212 Grader working on the new municipal football stadium in Amarillo. Does subgrade, shoulder work and drainage. It's punched the Klock Co.'s time clock for 3186 hours of work. O. W. Klock says, "This 'Cat' No. 212 Grader is the backbone of our street, alley and parking area work in the city of Amarillo. It's especially well balanced, and just the right size for our work. Small enough to work in close places, but powerful enough for big production—and fast getting from one job to another. Going to buy another just like it this year!"



NO. 12

In a No. 12 "Cat" Motor Grader you get a No. 12 from stem to gudgeon. The "Cat" Engine was built for a frame that gets full use out of its 100 hp. And the working speed range was engineered to get maximum production at each speed.

WEIGHT	22,200 lbs.
ENGINE	100 hp.
SPEEDS:	
1st	2.3 mph.
2nd	3.6 "
3rd	5.5 "
4th	8.5 "
5th	12.0 "
6th	19.3 "
1st R.	2.7 "
2nd R.	4.1 "

Price of the standard model No. 12 is \$18,928, f.o.b. Peoria, subject to change without notice.

NO. 112

With the No. 112 you get the No. 112's 73 hp. Engine on a No. 112 frame, with a No. 112 weight and a No. 112 transmission. You don't get mismatched power, weight or speed.

WEIGHT	19,330 lbs.
ENGINE	73 hp.
SPEEDS:	
1st	2.1 mph.
2nd	3.0 "
3rd	4.0 "
4th	5.6 "
5th	11.2 "
6th	16.0 "
1st R.	2.8 "
2nd R.	4.0 "

Price of the standard model No. 112 is \$9145, f.o.b. Peoria, subject to change without notice.

NO. 212

When you buy a No. 212 you get the same balanced performance. It has its own weight, its own frame, its own "Cat" Engine, its own working speeds.

WEIGHT	tandem drive 13,290 lbs.
	single drive 11,010 "
ENGINE	90 hp.
SPEEDS:	
1st	2.0 mph.
2nd	3.1 "
3rd	4.9 "
4th	11.9 "
R.	2.8 "

Price of the standard model No. 212 is \$4435, f.o.b. Peoria, subject to change without notice.

**DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT**

CATERPILLAR, PEORIA, ILLINOIS

REG. U.S. PAT. OFF.

Only ALLIS-CHALMERS MOTOR GRADERS have the

More and Better Work Done
with Less Power Effort



The **ROLL-AWAY** bladeboard has an invariable **Variable Radius Curve** that lifts material up and moves it away in an easy, rolling fashion. Each part of the blade forces material toward a different point instead of a fixed point — prevents packing, power waste and drag on entire machine. Material moves **WITH** an Allis-Chalmers Motor Grader — not against it!



**MORE
THOROUGH
OIL MIX**



**TOUGH
GRADING
HANDLED
EASIER**



**FAST,
ACCURATE
FINISHING**



**MORE
EFFICIENT
SOD
STRIPPING**

Check these other outstanding advantages of Allis-Chalmers Diesel-Powered Motor Graders:

EXCLUSIVE TUBULAR FRAME Strong, shock-absorbing, protects control rods inside frame.

HIGH CLEARANCE under circle and axle to handle bigger windrows.

TRAVEL SPEEDS smoothly synchronized with operator controls. All the needed power applied as required.

FULL RANGE OF BLADE POSITIONS . . . plus leaning front wheels, for easier ditching and sloping. Seven pitch adjustments, two offset positions.

GREATER STABILITY, Lift cases directly over circle turn — blade held firmly on work through direct down pressure . . . precision cutting.

GENERAL MOTORS 2-CYCLE DIESEL POWER — dependable, economical, instant-starting.

PROPERLY BALANCED for maximum traction and control.

PLUS . . . easier steering, full visibility, larger clutch, electric gauges, numerous other time- and money-saving features.

ROLL-AWAY

Moldboard

Standard On All Allis-Chalmers Motor Graders

Model	Brake Hp.	Weight
AD-4	104	22,140 lb.
AD-3	78	21,825 lb.
BD-3	78	19,042 lb.
BD-2	50.5	11,772 lb.
D	34.7	8,500 lb.

The Moldboard
That Moves Material
the Easiest Way...
by Rolling it!

Seeing Is Believing.

Ask Your Allis-Chalmers Dealer For a Demonstration . . . NOW!

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

FOR GREATER PRODUCTION
FOR EASIER OPERATION
FOR SIMPLIFIED SERVICING

HENRY DOELGER

PICKS LPC

MOTOR

SCRAPERS



for 12 million

MOVING 12 million yards of sand is a man-sized job in anyone's language. Henry Doelger of San Francisco tackled it to make room for a 7000 new home housing project at Westlake, south of San Francisco. Six LaPlant-Choate Motor Scrapers are moving 11,700 yards per 8-hour day, working on a 1600-ft. cycle. Each load averages 14.3 pay yards. Material is damp sand, weighing 3000 lbs. to the yard. Average loading time is 1-minute. All ejection and spreading is done in high gear. Each unit hauls 17 loads in a 50-min. hr.

Whether you're moving sand, mud or good scraper dirt, you'll be money ahead if you use profit-making LPC Motor Scrapers. Get the story first hand — talk to the men who own them or run them. There are reasons why more and more smart contractors are using the Motor Scraper.

Available now in 2 sizes. The "300" in the 14-17.5 yard class. The "200" in the 9-12 yard class. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; LaPlant-Choate Sales & Service, 1022 77th Ave., Oakland, Calif.

LAPLANT



CHOATE



Cable-operated Scrapers in 6-, 8- and 14-yd. also for all classes of truck-type tractors.



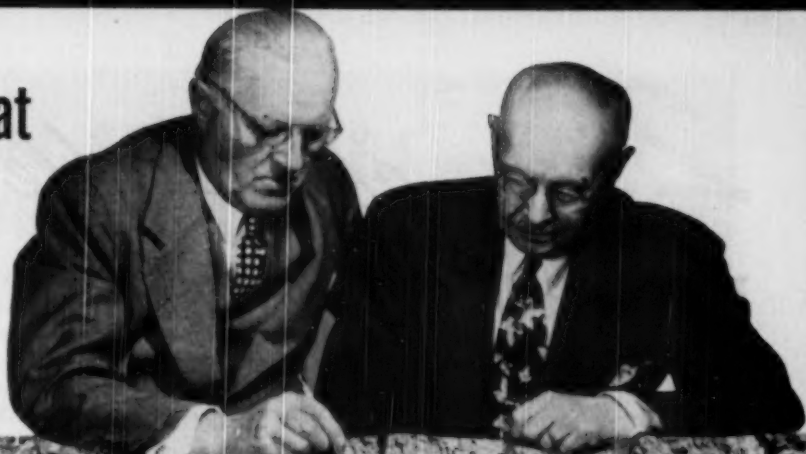
2- and 4-yd. Scrapers for truck-type and rubber-tired industrial tractors.



Hydraulic and Cable-operated Dozers.

**"there's a great
piece of
machinery-**

**FOR DIGGING IN
ROCK OR EARTH"**



**LINK-BELT
SPEEDER**



**L-B-S OWNERS
ARE GREAT
L-B-S FANS**

There's not much room in the contracting business for sentimentality, but in my travels around the country I find that Link-Belt Speeder owners have the same affection for their Link-Belt Speeder Shovel-Cranes that old time contractors felt for their hard working horses . . . and for the same reasons . . . Owners respect and admire faithful and dependable performance.

IT'S THE LINK-BELT SPEEDER LS-85

—The Super ¾ Yd. Shovel-Crane

When Otto Ashbach & Sons of St. Paul shipped their LS-85 to Decorah, Iowa to excavate 10,000 yards of rock, they knew that this shovel would do the job right, and at a profit . . .

Because they had learned years ago that Link-Belt Speeders are dependable and hard working—and have the speed to set good performance records.

After operating Link-Belt Speeders for 11 years, Ashbach superintendent, Clifford Cleveland, said to me: "I think Link-Belt Speeders will out perform any other machine."

I had heard those words many times before from owners, superintendents and operators, and once again I had a good report for the folks back home.

LINK-BELT SPEEDER



11-540

LINK-BELT SPEEDER CORPORATION
CEDAR RAPIDS, IOWA

Builders of the Most Complete Line of
SHOVELS-CRANES-DAGLINES

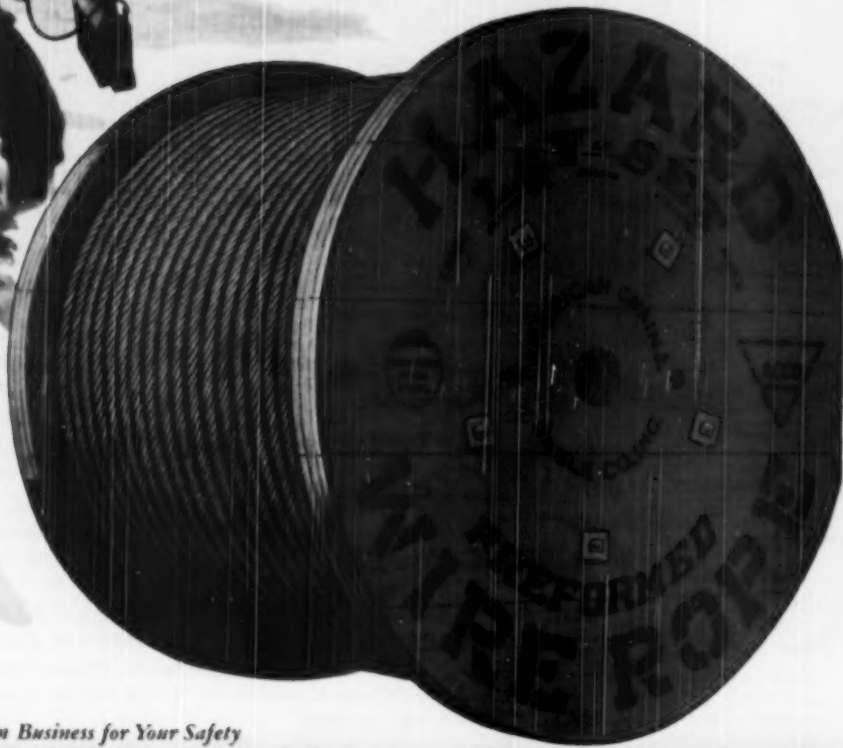
2 signs of valuable "finds"



What's sweeter music to a "sourdough's" ears than the bray of his burro? Why, it's the clicking of his Geiger Counter telling him uranium's at hand . . . and the louder it clicks the better the lode.

That's why prospectors today carry and count on the Geiger to tell them when they've made a VALUABLE "FIND."

You don't need a Geiger Counter to hit the mother-lode in wire rope value. Just look for the HAZARD REEL. It's the sign of a wire rope that users everywhere recognize and rely on for uniformity, longer service, easier handling and utmost dependability. It's the sign of more for your wire rope dollar . . . the sign of a VALUABLE "FIND."



ACCO In Business for Your Safety

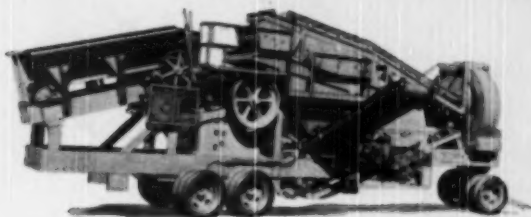


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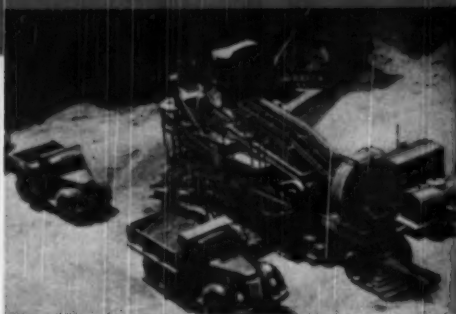
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4

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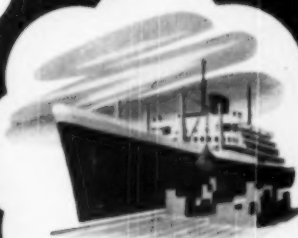
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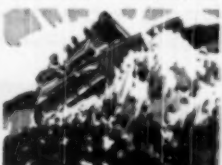
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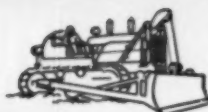
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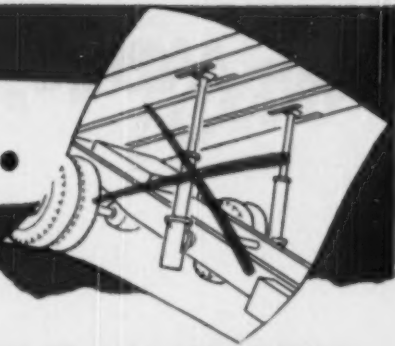


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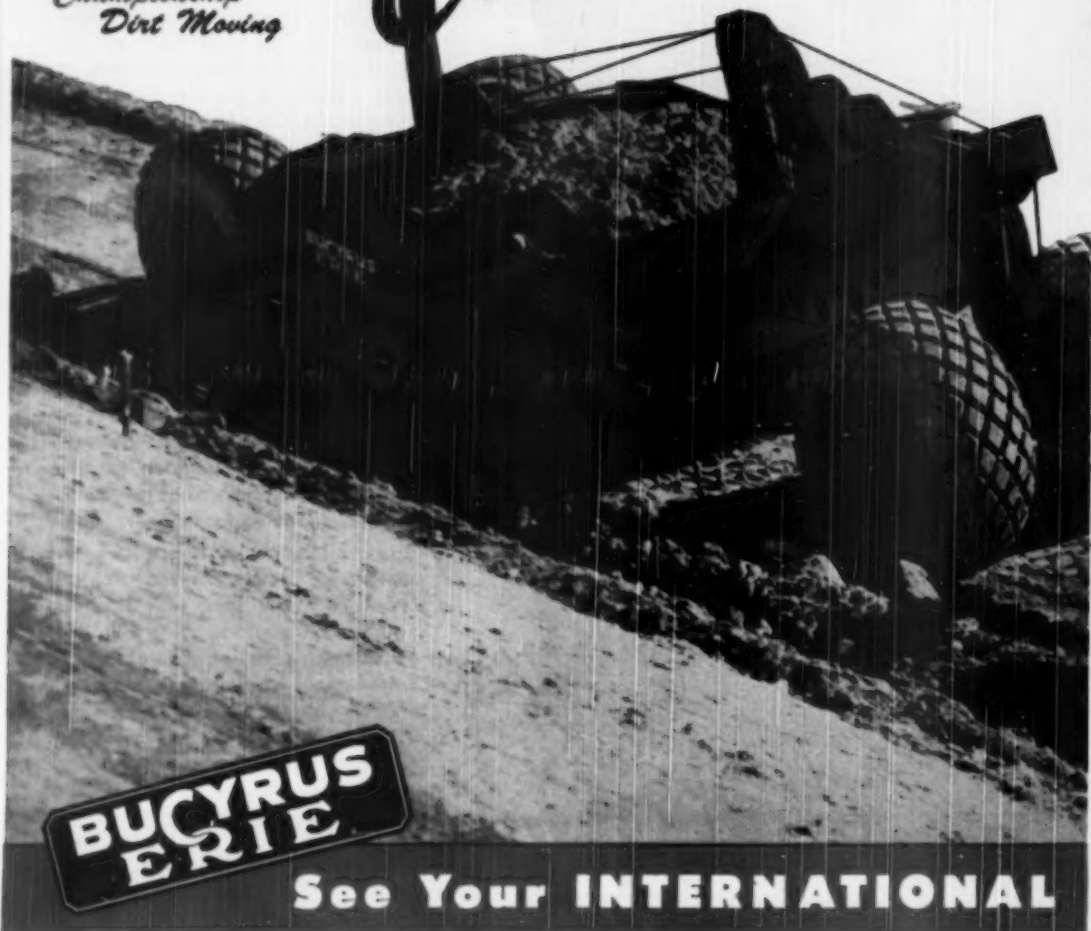
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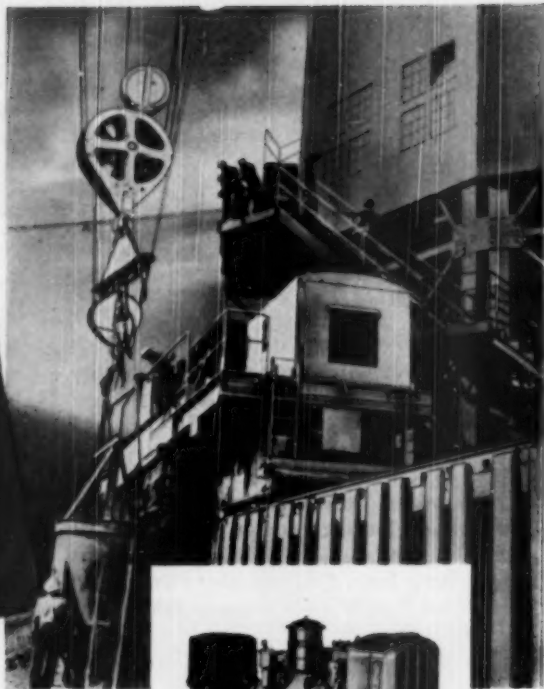
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Industrial Tractor Distributor

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Built by Washington Iron Works, Seattle, the concrete cars at Hungry Horse Dam have a top speed of 5 m.p.h. with a capacity pay load of 22 tons. Each is equipped with a 4-cylinder GM Series 71 Diesel generator set furnishing power to two 20-h.p. traction motors.

THREE specially built Diesel-electric concrete cars, used by the General-Shea-Morrison group at Hungry Horse Dam, are a vital link in the carefully planned facilities with which the contractor expects to place a million cubic yards of concrete this year.

Carrying two 8-yard side dump hoppers, the cars move concrete from the mixing plant to points directly under cableways where they discharge into buckets. This eliminates time lost moving buckets on and off cars—saves travelling time of the 500-ton cableway tail towers—increases cableway capacity by at least 25%.

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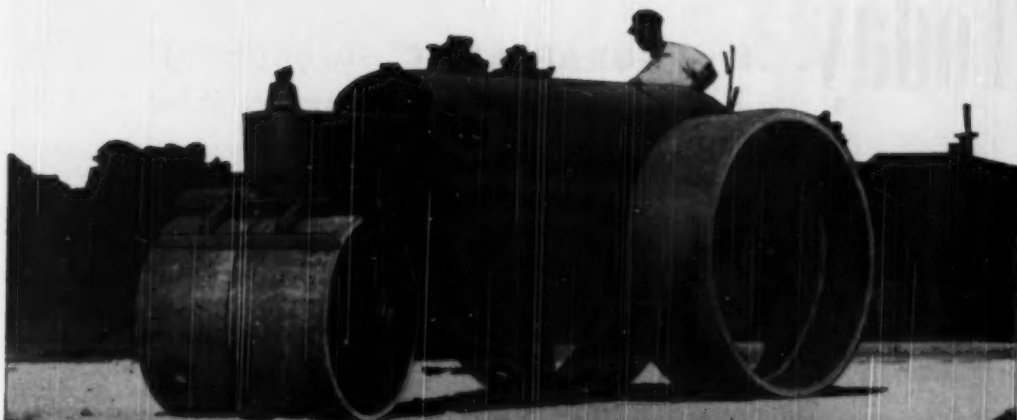
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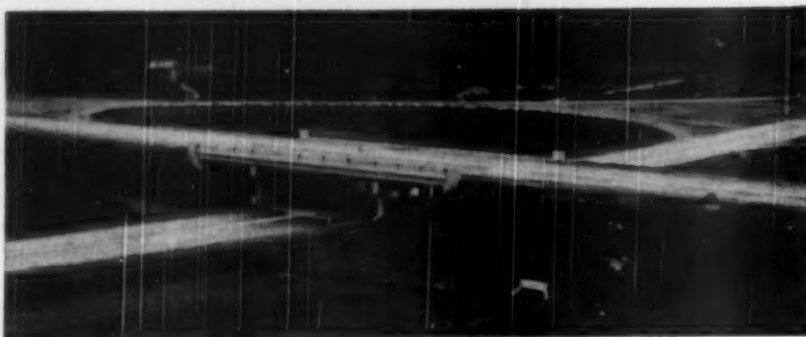
Ten Years Ago...

this test paving was laid in Minneapolis—the first commercial use of Atlas Duraplastic air-entraining cement. Badly scaled background section was made with regular cement. Foreground concrete was laid at the same time with Duraplastic cement. Here are both sections, photographed ten years later, after ten severe winters, heavy applications of de-icing salts and many freezing-thawing cycles—convincing proof of Duraplastic concrete's lasting durability. Longitudinal structural crack shows some raveling. Note perfect transverse joint.



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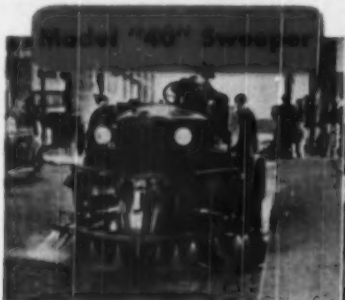
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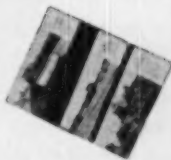
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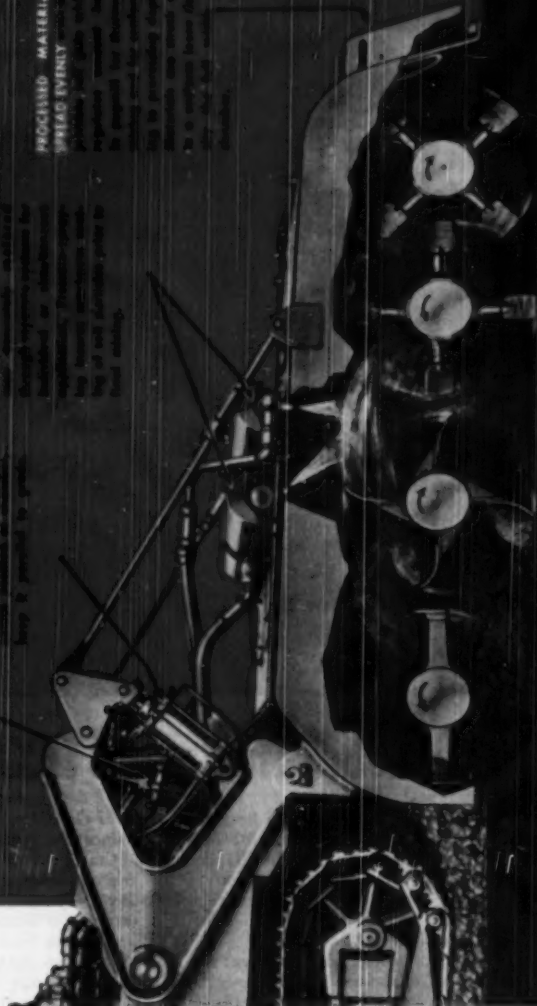
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Find out how *Texaco* top-quality lubricants and the *Texaco Simplified Lubrication Plan* can help your machinery do more work at lower cost.

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POUNDS OF MARFAK
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TEXACO Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

Paver Record?

Fast Pace Set on U.S. 66 Illinois Project

Thirteen miles of heavily-traveled Chicago-to-St. Louis route double-tracked by O'Connor Construction Co., whose outfit placed over 2100 lin. ft. of 10" x 24' mesh-reinforced concrete slabs on best day; pavers covered one 7-mile contract in 23 paving days

By C. M. Wahl

District Engineer, Illinois Division of Highways, Springfield, Illinois

ONE of the fastest concrete paver runs of 1949 in Illinois was made on a project which is also of special interest for a couple of other reasons. It represents another link forged in the double-tracking and modernization of busy U.S. 66 between Chicago and St. Louis, and it comes under the Illinois Freeway Act, which has proved so beneficial to date.

In 1943, the General Assembly passed the Freeway Act, which authorized the Department of Public Works and Buildings to designate certain roads as freeways, when such action appears to be in the public interest and in furtherance of safety and convenience to highway traffic. Passage of this Act is a recognition of the fact that unlimited access to

routes carrying large traffic volumes can seriously impair the use of the highways through the creation of traffic hazards.

U.S. 66 between Chicago and St. Louis is one of the heaviest traveled interstate routes in Illinois. In 1944 the Department of Public Works and Buildings stopped all further development of access to this highway by designating it as a freeway. As funds become available, the Division of Highways will continue to modernize this route by constructing a 4-lane divided highway. Only a small portion of this work has been completed.

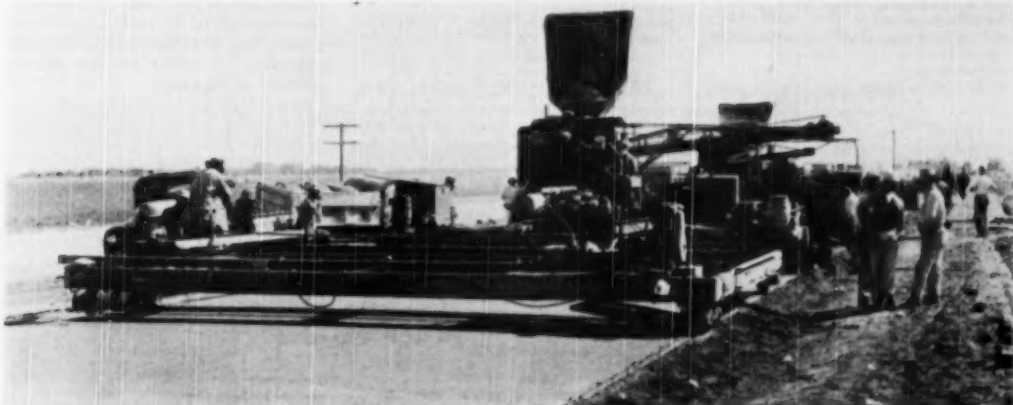
One section of U.S. 66 particularly in need of improvement is that between Glenarm, Sangamon County, and the junction with Route Illinois 48 near Raymond, Montgomery County. Here the original pavement was completed in 1929. The pavement was 18 ft. in width, with 9-6-6-9 in. section.

After 20 years of service, the old slab had deteriorated to such an extent that it could no longer be maintained economically.

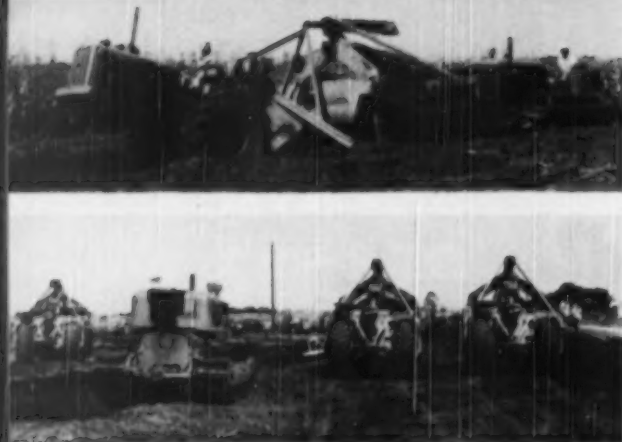
The first step in the modernization of the portion of Route U.S. 66 between Glenarm and the Raymond junction was completed in 1949 by the construction of 18.7 miles of portland cement concrete pavement of 24-ft. width and 10-in. depth. The new 2-lane pavement will eventually serve south-bound traffic only when the proposed 4-lane divided highway is completed. This project was broken up into three construction sections, and contracts were awarded in the summer of 1949, with completion date of pavement set at Nov. 20, 1949.

O'Connor's First Section

O'Connor Construction Company of Springfield, Illinois, and Fort Wayne, Indiana, was awarded the contract for one section on June 27, 1949. The job, which extends 6.96 miles minus a .95-mile exception for a grade separation, included 148,900 cu. yd. of earth and borrow excavation, 10,000 sq. yd. of bituminous concrete pavement; 88,000 sq. yd. of 24-ft. p.c. concrete pavement with 6-in. granular subbase, and a



★ Daily runs were as high as 1540 cu. yd. of mesh-reinforced concrete pavement, using a 34E dual and a 34E single drum paver



★ Shallow skimming accounted for most of the earth yardage. Allis-Chalmers MD-19 tractor with Tournapulls

minor yardage of bridge approach mat.

The new pavement is about 50 ft. west of and parallel to the old 18-ft. concrete pavement, which will eventually be torn up and rebuilt as the northbound lane. In the first mile, however, it was necessary to remove the old pavement in order to construct the new, necessitating the construction of a detour. This was accomplished by first grading the northbound lane, placing an 8-in. compacted stone mat, 26-ft. wide, treated with calcium chloride. The mat will serve as granular blanket under future 24-ft. p.c. concrete pavement. Traffic used this surface in the detour.

At the beginning and end of the .95-mile exception, crossovers were constructed between the old and new pavement, the old pavement being widened and resurfaced temporarily with 3 in. of bituminous concrete.

The resident engineer started a staking party July 8, 1949, and the contractor moved in on the same date, starting grading operations on July 14, 1949, with the following equipment:

- 3—self-propelled scrapers (12 cu. yd.)
- 6—131 hp. tractors and scoops (14 cu. yd.)
- 2—12 ft. motor patrols
- 4—131 hp. bulldozers with tandem sheepfoot rollers and discs
- 2—pusher tractors

Granular subbase was started July

25, 1949, and was well advanced when paving operations started.

The contractor's plant, located along a rail line adjacent to the section, consisted of the following equipment:

- 1—150 bbl. cement bin
- 1—sand bin
- 1—double aggregate bin
- 2—1½ yd. cranes
- 1—¾ yd. crane

The efficiency of this plant was very high, with batch trucks loading coarse aggregate first, then cement, followed by sand.

During times of paving operations, the contractor had at the plant, or in transit, over 300 cars of material. The Division of Highways maintained a proportioning office with two proportioning engineers at the plant during paving operations. The resident engineer and two inspectors handled all other engineering and inspection involved during construction operations.

Paving started Sept. 1, 1949, with the following equipment:

- 1—34E dual-drum mixer
- 1—34E single-drum mixer
- 1—34E dual drum mixer (in reserve)
- 2—concrete spreaders
- 1—concrete finishing machine (screed)
- 1—concrete finishing machine (in reserve)
- 1—bull float (mechanical)
- 1—power subgrader
- 2800 road-feet of 10-in. forms
- 1—65 hp. bulldozer
- 1—12 ft. motor patrol

The O'Connor Construction Com-

pany also had the contract to construct Section 111-R, 7.97 miles in length, adjacent to this section, with a completion date of Nov. 20, 1949. As it was intended to use the same plant setup and paving equipment on both sections, the paving schedule of this section called for completion by Oct. 10. Despite the fact that the contractor was unable to pave during the first week in October because of rain, the paving was completed on Oct. 10.

Prior to paving operations, the contractor averaged about 65 men on the job, but when paving commenced the force was increased to about 138 men. Rate of pay was \$1.55 per hour for common labor, and \$2.35 per hour for skilled labor.

September Big Month

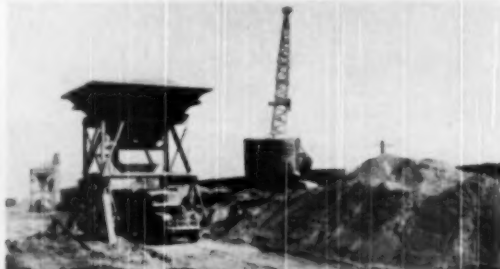
On September 27, the contractor placed 2,113 lin. ft. of 24-ft. pavement, and from Sept. 26th to Oct. 1, inclusive, 10,866 ft. of 24-ft. pavement 10 in. thick was placed. For the 23 days on which paving operations were performed, the average was 1,598 ft. per day. Both pavers operated on the same shoulder, with the 34E dual-drum paver placing approximately 75% of the concrete, which was struck off 7½ in. thick, followed by placement of fabric concreting of the top lift by the 34-E single drum paver.

Finishing followed standard procedure, after which impermeable paper curing mat was placed and left on for 72 hours. Water was supplied by a 2½-in. pipe line. Shoulders were constructed as soon as pavement strengths were sufficient to permit equipment to operate thereon. The pavement was not opened to traffic for its entire length until Nov. 18, at which time the paving section to the south was completed and opened to traffic.

J. F. Parker, vice president O'Connor Construction Company, was in charge, assisted by Paul Williams, superintendent, C. M. Wahl, district engineer, and J. L. McCumber, resident engineer, supervised for the Illinois division of highways.



★ (Left): Showing layed centerline divider and tie bars in place, along with joint. Mix water was fed by hose from tank trucks on opposite side. (Right): Crane was mounted on stock-pile material to facilitate unloading gondolas at the batch plant



Highway Flight Strips

—The Solution to Private Flying

—The Road Builder's Job

By H. K. Glidden

Contributing Editor, Roads and Streets

A SMALL armada of personal-type airplanes left Portland, Oregon, in March, on an air tour to Havana, Cuba. The trip to Havana was under the strict control of the sponsors of the tour and was accomplished without incident. The group broke up at Havana with each pilot choosing his own route home in order to visit friends and relatives enroute.

Two of the airplanes and six people failed to return to Portland. One airplane crashed and burned in Utah, and the other, with four passengers, was lost in the mountains of Oregon on a squally spring day.

In most people's minds, the airplane received all of the blame. The use of the airplane and, consequently, its sales undoubtedly have been adversely affected. Presumably, it will be difficult to organize another air tour out of Portland, Oregon, regardless of the fact that a year ago another tour, also organized in Portland, made the trip from Portland, Oregon, to Portland, Maine, and return without mishap.

In reviewing this situation, we are not expressing any original ideas. We hope that by properly combining the expressed thoughts of many authorities on aviation, transportation and engineering, we can clearly show that the airplane itself was not at fault in the two accidents. Also, we propose to show that the two pilots involved were likewise not to blame, but came to their tragic end for the sole reason that adequate facilities had not been provided for their use.

The situation has a close parallel in the early development of the automobile and public highways. Countless motorists have met with death or serious accidents because of poorly designed or inadequate highways. In fact, they still do. The one thing that almost surely could have saved the lives of those six people would have been properly spaced small airports along their route of travel.

While the present Federal-aid Airport Program is doing much to provide new and better airports, the emphasis is on the large terminals. Many

small airports are being built, but in almost every instance they are designed to serve a community rather than a route of air travel.

We are in favor of the Federal-aid Airport Program as it is being carried out, but we strongly favor its being supplemented by the construction of inexpensive flight strips along every principal highway throughout the United States. We advocate that these flight strips be graded to the most practical dimensions for safe operation of the personal or executive type of aircraft. The idea we have in mind is simply to widen the highway right-of-way by a matter of two or three hundred feet, for a length of about one-half a mile at regular intervals.

In many parts of the country, these strips would not need to be surfaced, as a good turf can be grown in a short time. However, most of them would need to be given a type of surfacing identical to that used on the secondary roads in the community involved. The sites for the flight strips could be chosen by any highway engineer on the basis of a small amount of standardized criteria furnished after a study of the program had been made by aeronautical interests.

The main idea of the whole program would be to keep the flight strips simple and as nearly identical to highway construction as possible. There is no possible reason why this type of development should require specialized

training on the part of the highway engineer.

Wind direction is becoming an increasingly less important factor in airport design, but even this could be taken care of easily in areas having definitely prevailing wind directions. The following are the arguments we advance in support of this program:

First, the personal and executive type of aircraft will continue to be expensive and unduly hazardous as long as the pilot is required to attain a high degree of proficiency in navigation and meteorology. Most business men and people who have attained a financial status permitting them to afford an airplane, absolutely will not spend the time and effort required to attain sufficient proficiency. The number of highly trained pilots who meet disaster every year on account of bad weather, clearly demonstrates that even with intensive study and training, it is almost impossible to overcome weather hazards with the limited amount of radio facilities which can economically be placed in the personal type airplane.

Second, the sale of personal type airplanes will never reach the volume which will permit the manufacturers to produce them cheaply until the general public attains confidence in the ability of the average person to fly and navigate an airplane, and further, until the owner of a personal airplane is provided with a large number of places to visit. The history of the de-

★ Flying farmer's private air strip. Will there be many such projects in the years ahead? Much depends on flight strip development, thinks author of accompanying article





★ Layout of roadside flightstrip which could properly be built and maintained by the state highway departments

velopment of the airplane is following closely to that of the automobile. It can be recalled that the sale of automobiles did not reach high proportions until the advent of the Model T and Federal-aid to highways.

Third, to quote Arthur Godfrey, "The easiest way to navigate is to follow a highway." This method may not always follow the shortest route, but with the carrying out of a highway marking program it can certainly provide the simplest and safest means of navigation. The personal pilot who starts out on a trip in the face of questionable weather conditions needs only to follow the highway which goes to his destination. With a flight strip every twenty or thirty miles, he knows that he can set his airplane down on a flight strip any time the weather gets too bad and wait until conditions improve.

If flight strips are spaced at say thirty mile intervals, the pilot would never be more than fifteen miles from a flight strip. Since the airplane moves so much faster than weather does, the pilot who pokes his nose into marginal conditions could always turn around and get back to the flight strip he has just passed before the storm engulfs the whole general area.

Fourth, the handling of this program by the State Highway Departments would allow each flight strip to be built and maintained with the very minimum expense. The engineering staff and survey crews are already organized and available to incorporate flight strips as part of new highway construction and to add them to existing roads. All highway departments have trained land acquisition personnel to make the problem of acquiring property as simple as possible. The plans and specifications can be standardized and easily made part of a highway contract. All of the quantities and unit prices will be identical with those required in the road construction. There will be no aspect of the work with which the highway engineer, contractor, and maintenance crews will not be entirely familiar. Highway maintenance crews repair pavements, remove snow and check drainage periodically. It will require

no extra travel or equipment for them to perform the same work on the flight strips.

In many instances, realignment of highways requires the abandonment of some sections of good highway pavement. Many of these abandonments make perfect flight strips and can be converted with a minimum of expense.

Fifth, the personal type aircraft has proved to be exceedingly useful to the farmer. This fact is borne out by the rapidly increasing growth and membership of the Flying Farmers. Flying over the United States, one sees more and more personal aircraft parked in farmers' back yards. Many farmers have taken as much as 5 or 10 acres out of production for the purpose of providing a flight strip for their own use. If the flight strip program is carried out, these flight strips will provide ideal places for farmers in the vicinity to build small hangars in which to keep their personal aircraft. Properly spaced flight strips would make it possible for most farmers to reach a flight strip by driving a short distance. Most farmers' flight strips are not properly constructed, surfaced or drained. A flight strip built to secondary highway specifications will ordinarily provide a much better and safer place from which the plane can operate. On the other hand, properly spaced flight strips will make it possible for city dwellers, traveling salesmen and businessmen to reach the farmer quickly and easily. Repair parts, emergency medical treatment, and any number of other services to the farmer can be speeded up tremendously as this program is completed. Flight strips can offer unlimited business opportunities, both aeronautically and in the merchandising of farm produce.

Sixth, the history of transportation clearly indicates that for any mode of transportation to be successful, it must be possible for people and merchandise to be easily transferred from one type of conveyance to another. Flight strips will make it possible to provide convenient connection between the airplane, automobile and truck, as well as specialized means of trans-

portation such as boats and pack trains.

Seventh, the trend is toward a shorter work week with more time allowed for recreation on week-ends. One of the main reasons why more people do not take week-end trips is the fact that the pleasure time re-

Mr. H. K. Glidden,
Boise, Idaho

Regarding your proposal for Highway Flight Strips, I read it and not only discussed it with our employees but with quite a number of itinerant pilots as well. Without exception, every one of the pilots I have talked with feel that this program would be one of the finest things ever to be offered to the field of Aviation. I can't see how there would be a question in anyone's mind about the value towards helping private flying.

The auto industry would be in the same stage today as it was in the early twenties if it were not for the well constructed and surfaced roads which have been constructed. I feel that flying will remain the same until something is done to make a pilot feel that he can travel from one place to another in relative safety without going over endless miles of terrain, with no hope of being able to set down in case of trouble or bad weather.

I would like to cite an instance which happened to me which will bear out this point. I was on a trip to Denver last year via Salt Lake City and was flying that portion of the route that lies between Price, Utah, and Grand Junction, Colo., when I encountered an extremely severe snow storm which necessitated my turning back. The storm was very general though and I was forced to land on the highway. You will note that the route from Price to Grand Junction is over 150 miles with no part of it, whatsoever, served by an airport. It would have been a grand feeling to have known that I could have found an airport no further away than 15 miles at any time during that experience.

You can count on our wholehearted support of this program.
E. M. Wilson, President,
Wilson Flying Service,
Pocatello, Idaho.

maining after arrival at a destination is usually not long enough to justify a lengthy and energy consuming automobile trip. The use of the personal airplane changes this picture completely and makes it possible to take trips of three, four and five hundred miles and still have a large percentage of the week-end for pleasure.

A highly developed system of flight strips will not only solve the navigation problem and remove much of the weather hazard, but will also make it possible for the people in the cities to take full advantage of recreational areas. There is also the factor of avoiding and thereby relieving week-end highway congestion.

Eighth, the performance of the present day personal airplane is so trustworthy that night flying is becoming increasingly popular. There will remain a large degree of hazard in night flying until such time as lighted airports are closely spaced. Airport lighting has been simplified and standardized to a point where it can be purchased and installed as easily as street lighting. With the development of public utilities and rural electrification, it should be possible to light almost any flight strip at a nominal cost.

Ninth, because of the lack of facilities, such as the flight strips we have talked about, the aircraft manufacturer is desperately searching for ways to improve the airplane's flight characteristics to a point where it can be flown slowly and taken off and landed on short trips.

As we see it, the main disadvantage of this program of aircraft development is that most devices so far advanced incorporate automatic features or call for the use of mechanical devices which are subject to failure in flight. Give us fuel injection to eliminate carburetor troubles and we are well satisfied with the present day aircraft. We believe it should have the minimum number of gadgets to push and pull. Every added device which

operates manually or automatically is a potential source of trouble. These devices are wonderful as long as they function, but a pilot comes to rely on them so completely that when one of them fails to function he can easily find himself in an emergency which he does not know how to handle.

Every added feature on an airplane increases its cost. Our contention, therefore, is that the present day personal airplane is a highly satisfactory means of transportation and that its general acceptance and safe usage depends only on the public being provided with ample facilities for its operation. A nation-wide system of closely spaced flight strips adjacent to highways is our suggestion as the key to the whole problem.

Reversible Road Hone Developed by Connecticut Employe

*One of a series of safety papers by
Connecticut highway workers*

ROAD hones in Connecticut, formerly pulled with drag chains, now are suspended in front of the trucks, using snow plow attachments. Now Connecticut state highway department has further improved its procedure by developing a reversible hone.

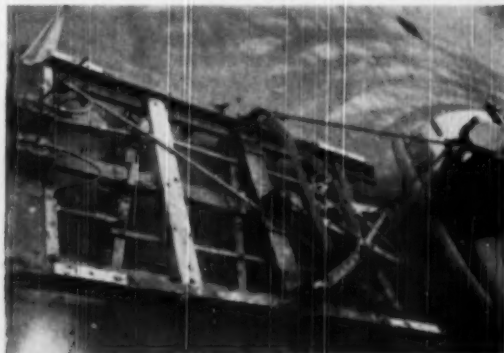
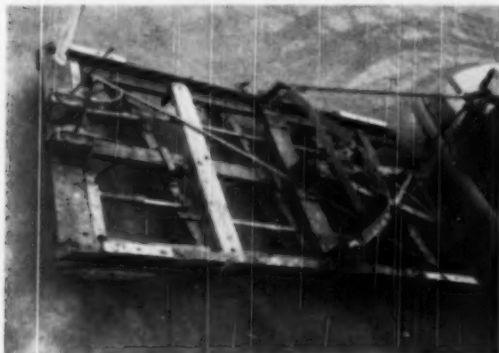
When the hones were changed to the fronts of trucks, in 1942, department maintenance forces found that although mobility was improved, there was still the need for driving against traffic, in order to bring honed material back from the shoulder to the road center. The first, and obvious idea, was to provide two hones, one for a left-hand stroke and the other for a right-hand cast. This sounded like a wasteful procedure, both because of the costs attaching to two pieces of equipment and also because of the time lost in changes from one hone to the other. In addition, it was

found that because the fixed angle of the blade controls the depth of the cut it was not always possible to secure the desired depth of cut under the varying conditions existing on Connecticut's 3,000 miles of state highways.

Howard E. Dickinson, of the maintenance forces, the originator of the front-end hone, has devised a blade adjustment. Using scrap materials and employing a discarded snow plow hydraulic pump, Mr. Dickinson produced an extremely practical and versatile tool for improved highway maintenance.

The improved front-end adjustable blade hone consists of a timber frame reinforced by steel plates and angles which carries three parallel blades. The blade beams are pivoted on the center longitudinal frame member, and by the use of the hydraulic pump. Their angle with the frame can be varied to provide a left or a right-hand cast. The change can be made by the driver in a few minutes. The blades are maintained parallel to each other at all times and are securely held in each position by a system of blocks and manual catches. Each blade is 6½ ft. long and is attached to the blade beam by bolts through slotted holes to allow for adjustment and wear. The blades themselves are reversible so that a second cutting edge can be used. The frame is 11'8"x6'4" and is mounted on the snow-plow "circle" and "A" frame on the front of the truck. This enables the driver to swing the hone laterally as well as raising and lowering it vertically. It can be readily seen that this provides complete control over honing operations.

H. H. Kranz, 61, veteran city engineer of Cincinnati, died recently after 24 years' service in executive posts with his city. He was president of ARBA's municipal division and author of numerous technical papers.



★ Connecticut's reversible road hone—set for left hand cast, and for right hand cast

★ Traffic Safety Problem Challenges State Highway Engineers—and Legislators



*The Millionth Human Being Killed Since *
The Automobile Era Began*

THERE is no cure-all for the traffic accidents which fill the news columns and bereave so many families in your state. But they can be greatly reduced—by applying every known technique of enforcement, education and engineering to the limit—relentlessly, everywhere, every day.

That is the challenging conclusion spotlighted again last month by the President's Highway Traffic Safety Conference, meeting in Chicago. This year's gathering, confined to "committee progress reports" with about two hundred traffic and highway engineers in attendance was no less important than the full-dress annual Conference meeting usually held in Washington.

Accidents Again Rising

The Conference's brilliant group effort is credited with preventing at least ten thousand traffic deaths annually, through its function of codifying existing methods, blueprinting community safety procedures and stimulating "action programs"—and through its dramatization of the traffic safety problem. For three years the trend in accidents has been downward not only in relation to vehicle-miles of travel—the basic yardstick—but also in total fatalities. But now this trend is slowing up.

The fatality rate per vehicle-mile is still at a record low. But here's the gimmick: first-quarter estimates for 1950 revealed that, sure enough, rising vehicle registrations and traffic have brought rising accident totals—fatalities are 9% ahead of 1949 and 34,000 deaths are in prospect during the year. The problem is most acute on the arterial system which interconnects your state's cities, towns and farming or ranching areas, and which carries the bulk of all rural auto and truck movement.

* His death will occur sometime this year, according to authoritative estimates.

Another ten thousand lives could be saved each year by further applying the "know how" compiled and published in the Conference's latest committee reports. These reports cover Engineering, Accident Records, Motor Vehicle Administration, Education, Laws and Ordinances, Enforcement, Public Information, Organized Public Support, and the Conference's Action Program as a whole.

In the field of highway and street engineering, principles of safe roadway design are beginning to be established and await application. We know that the accident rate per million vehicle-miles is much lower on 2-lane roads of latest design than on the average 2-lane road built in the 20's or 30's. We know, for example, the safety value of more width; 22 to 24 ft. wide road pavements of two lanes are about 50% safer than obsolete 16 to 18 ft. pavements for the same traffic where heavy flow is carried. We know that the accident rate climbs as 2-lane roads become more congested; that the number of curves per mile bears a definite relationship to wrecks; that bridges on 2-lane roads whose handrails crowd the pavement edge—and there are thousands of such bridges!—deal death at five to ten times the rate of modern bridges whose decks are five or more feet wider than the road pavement.

We know a great deal today about the safety value of proper traffic signs and pavement markers.

If traffic volume justifies a limited access expressway, the injury or fatal accident rate, following completion of such facilities, will drop to a small fraction compared with ordinary streets or roads. The famous Arroyo

EDITORIAL

DO by-passes around small or not-so-small communities hurt local retail business, as many a chamber of commerce has feared? A California study has answered this much-discussed question, for a particular situation at least. The conclusion in the case of Auburn, California, is that a new expressway by-passing Main Street congestion has helped local business in virtually every particular.

Engineers in other states will do well to read the report of this study, presented by W. Stanley Young in the May-June, 1950, issue of *California Highways and Public Works*. Auburn is en route between the Bay area and the Lake Tahoe resort region on the Nevada-California line. The by-pass, a 4-lane divided Freeway, was completed in 1947. California division of highways engineers, seeing

an opportunity to make a clear-cut study, immediately began compiling information on business volume and trends in Auburn. They dug particularly into business conditions for restaurants, service stations, bars, apparel and outing goods stores, and other retail establishments having a special interest in out-of-city patrons. These data were correlated with facts on the state-wide business level, and also with both state-wide and Auburn-area traffic volumes.

Auburn's local traffic fell off 10% during the ensuing two years, while traffic rose 12% for the state as a whole. But local business rose 17% compared to only 14% state-wide in the period. Cafes and bars enjoyed better business than the state average, as did most other merchant categories. The bugaboo is dispelled, at

least for Auburn.

This study, by the way, is part of a continuing public relations effort being made in California, which can be pointed to as one of the reasons why this state is No. 1 in postwar highway advancement.

THE Utah State Road Commission has finally granted an increase in salaries to the Chief Engineer, Staff Members, District Engineers, and Resident Engineers. This recognition is bound to reflect in better road service in the state.

Although changes in the rest of the categories have not been made in entirety, assurance has been given that action on all pay rolls would be taken within a short period of time.

Seco Parkway in Los Angeles, built before the war, bears this out. In the period 1941 to 1949 this parkway chalked up a safety record of only 1.9 fatalities per one hundred million vehicle miles of traffic, compared with 13.3 for the California state highway system as a whole—seven times as safe!

The "Know-How" is Waiting

In other words, we know how to build safety into our roads. Highway engineers stand ready to rebuild to modern designs that, because of their *inherent* safety, can prevent millions of injuries and uncounted deaths during the next generation—even without further advancement in enforcement and driver education!

Highway and municipal department leaders, however, have made only a bare beginning on two vital tasks. One is the setting up of scientific methods of reporting accidents in relation to apparent causes and to the condition of the road. The other is the compilation of reliable estimates of the economic worth of rebuilding roads for safety—figures that put the proposition on a cold money basis, forgetting human suffering and grief. The data from these efforts will help engineers back up their contentions of the accident-prevention value of modern highways over obsolete, inadequate facilities. When a practical-minded legislator asks, "By what per cent can we hope to reduce accidents?", we cannot fully answer him as yet in most states, but the answers are not far away and such data must be compiled.

Connecticut is a leader in this new kind of highway research. Under such enlightened leaders as Roy E. Jorgensen roads which are "up to standard" for their traffic are used as control sections, for comparison with sub-standard roads as to the "accident proneness" or rate of accidents.

Facts already found show that all of us have, if anything, underestimated the safety value of highway modernization. In a summary presented before the

Highway Research Board last December, Mr. Jorgensen concluded, "If all our state's roads had been up to standard during the four years 1945 to 1948, about 16,000 accidents could have been avoided, or 43% of all those which did occur. If this 4-year total were converted to the 1950 annual rate, the accidents which could be eliminated would be about 5,300 for this year."

In terms of Connecticut experience this in turn would mean 84 lives saved and 2,600 injuries prevented, figures which represent also a preventable economic loss of \$3,800,000 annually. Capitalized over a 50-year life this sum becomes \$190,000,000. (What price human life!)

Rebuild for Safety

Accident prevention, alone, hence is eloquent reason for progressively revamping the obsolete, worn-out or inadequate roads now hampering economic life in every state. Lost wages, hospital bills, property damage and other economic losses from auto smash-ups in your state reach totals that stagger the imagination! In fact such losses often equal the sums now expended in road construction.

What of the future? If your state is typical, your highway system as a whole will never get safer but will gradually retrograde under traffic, unless the construction pace is sharply stepped up. Traffic is presently wearing roads out faster than replacements are built. Your state legislature holds the key. Whatever the national congress contributes in federal-aid—and whatever local toll projects are established for special situations—the problem in the long run is primarily one of devising sound state-wide highway financing programs from state and local revenues.

Do your state's legislative leaders have the full picture on traffic accidents and the role that highway modernization can play in their reduction?

—Harold J. McKeever

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS

JOB and EQUIPMENT IDEAS

Mile of Crane Cable Re-threaded with Tractor

Took only single day and reduced man-hours to 1/9 compared with old methods

A one-mile length of new 1-in. steel cable has been installed on a 100-ton, 100-ft.-high stiff-leg crane at the San Francisco Port of Embarkation, using an ingenious installation method which effected large savings of time and money.

The cable replacement was part of a crane rehabilitation project initiated by Lt. Col. C. D. Penniman, Chief of the Port Transportation Division, which operates the materials handling and vehicle equipment maintenance of the Port.

The replacement operation, which ordinarily takes two weeks with 8 to 10 men, was accomplished in 9 hours by 7 men under the supervision of John Johanson, crane-shop foreman.

A spare cable reel and a tractor for motive power were used. The new cable, weighing 5 tons, was spliced to the end of the old strand. The tractor then began pulling the old cable

★ General view of the 100-ft., 100-ton stiff leg crane. Boom is extended to maximum height and hook is on ground in center of picture to place as much of cable on crane as possible (U.S. Army photo)

★ First step in reoving crane. Mechanics are welding old and new cables together, using staggered splices. (U.S. Army photo)

★ Reoving operation under way. Two men on housing are pulling old cable off reel through snatch block. At this point a spare reel, hitched to another crane for power, takes over. New cable can be seen running along bottom of fenced-in section. Reel from which rope is being unwound is behind building. (U.S. Army photo)

out of the sheaves to the spare reel and the new line was worked into place. The replaced cable had been in use throughout the war years at Pier 7, Oakland Army Base, lifting thousands of tons of heavy cargo.

With crane equipment parts now readily available, the Transportation Division Maintenance Branch under Lt. Col. Henry Kellher instituted an extensive rehabilitation program which brought the equipment up to standards which were better than new in some instances.

For instance, booms of crawler and gantry cranes were completely rebuilt, using 1/2-in. raw material instead of 3/4-in. material, thereby reducing the possibility of structure buckling. Jib booms were rebuilt in the same shop from raw materials having approximately twice the specified strength.

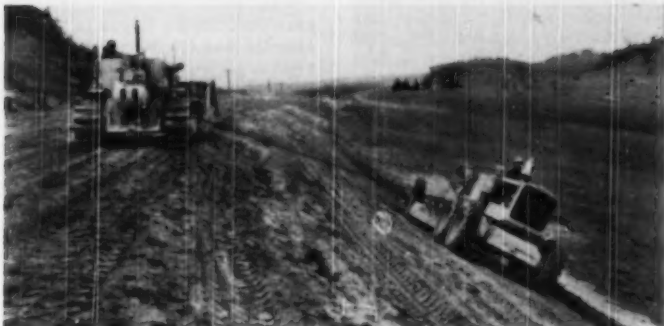
Shipping Containers Double as Tool Crib

Weathertight steel shipping containers developed by Dravo Corporation, Pittsburgh, serve doubly as foundations for a portable field office and as tool cribs on a construction project near Pittsburgh. Originally designed to protect cargo against pilferage and damage in marine and rail shipments and to facilitate material handling, the 275-cu. ft. capacity Transportainers were adopted by The Contracting Division of Dravo as portable tool houses because they can be moved readily from job to job. Carpenters built shelv-



ing in the containers for their tool cases and installed lights (see close-up). Equipped with lifting lugs and skids, the Transportainers can be handled by cranes or lift trucks. Construction men said the units save the time and expense involved in building a tool house at each new job. They also can be locked securely against the threat of pilferage. Considerable handling expense is eliminated because the Transportainers can be moved intact without disturbing the tools and equipment inside.

★ Shipping containers which serve also as tool cribs

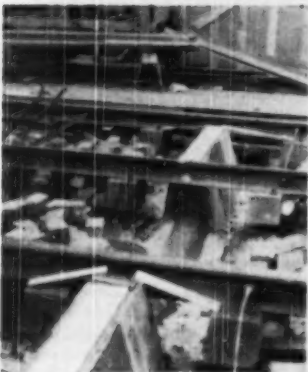


★ One of the methods of trimming slopes observed today with growing frequency.

Economical Slope Trimming

Slopes on highway fills are often made 2:1 or easier these days, and this practice pays off not only in minimizing erosion, but also in permitting the contractor to finish out with virtually no hand labor or "chalk line" tinkering.

The accompanying picture was taken last summer on Highway 53 in Wisconsin. The road contractor was Fletcher Construction Co. of Menomonie, Wis. Machines are Caterpillar No. 12 motor grader and Caterpillar D8 tractor, the tractor anchoring the grader by means of two cables hitched to the front and rear of the grader frame.



Special Drop Hammer on Traxcavators

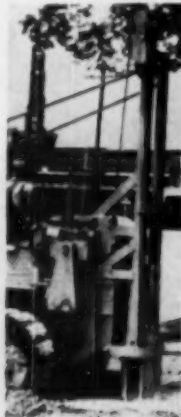
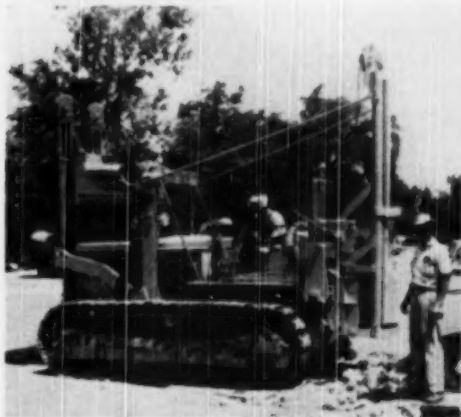
The accompanying photo shows a drop hammer attachment specially built for a D6 Caterpillar tractor with Traxcavator loader. A dozer blade is attached to the front-lift mechanism,

instead of a loader scoop, for use in leveling and piling debris, etc. It is being used here to break up pavement curb and gutter in Nacogdoches, Texas. All the information available is "what you see in the pictures," but this should give leaders the idea. Reynolds & Hoff, contractors, Tyler, Texas.

Shoring Electric Railway Tracks for Grouting

The accompanying photograph shows how old granite pavement blocks were used as supports for railway track in Milwaukee, in connection with tearing out the track zone and repaving around and under the ties with concrete. Also shown in this scene is the form for inspection pockets or utility lines running under the street.

Ready-mix concrete was used after excavating the old pavement and track, and including either new or salvaged rails in the position shown.



★ Showing drop hammers in "down" and "up" position

TNT on the Menu

Unusual blasting methods and equipment used on heavy Hoosier road job

By Harold Maxwell

Special Correspondent to Roads and Streets

ONE of the heavy road grading jobs completed in Indiana during 1948 was the 6.47-mile relocation of state route 37, part of a new line between Martinsville and Bloomington. Ralph Myers Contracting Corporation, of Salem, Ind., was the contractor for the work, which comprised a 22-ft. paved roadway with an additional truck lane on the "up" side of long 4% grades.

Major rock cuts were located near the center of each 3/4-mile contract.

More than 67,000 yd. of rock were removed from one 60-ft. cut, still known as "Tunnel Hill" because the original plans called for a tunnel at this point.

Rock excavation accounted for 278,000 cu. yd. of the 695,000 cu. yd. total yardage. Before drilling started, the sandy clay overburden was removed by scrapers. In many cases a rooter was required to remove the harder clays or softer rocks immediately overlying the solid rock. This material was so hard that only one rooter tooth could be used.

Two blasting crews were required to keep ahead of two shovels. Each crew was equipped with three wagon

drills and two compressors. One 215 c.f.m. compressor, mounted on a D8 Caterpillar tractor, could go anywhere on this project, and could tow the wagon drills and other drilling equipment.

Wet Surplus TNT

Holes were staggered and spaced at approximately 5-ft. centers each way. Practically all holes were drilled vertically with 2 1/2-in. to 2 3/4-in. bits. Depths varied from 12 ft. to 18 ft. Myers tried nearly everything in blasting to determine the best method of breaking up the Borden shale topped with a layer of cap rock. First 4 or 5 lb. of dynamite and a

dynamite cap were tamped in the hole in the usual way. Then TNT was poured in the hole to within 6 ft. of the top. The top 6 ft. was filled with drill cuttings. Experiments with only one stick of dynamite proved unsatisfactory. Often the TNT did not shake the bottom sufficiently to detonate the dynamite.

Very little of dynamite was slit. Most of the dynamite used was perforated and tamped very well. Fortunately all holes were dry—TNT won't stay down in wet holes. Gelatine dynamite was used during wet weather. Both 1 1/4" x 8" sticks and 1 1/4" x 18" sticks were used. The latter saved time loading the deeper holes.

Both 40% and 60% dynamite were used, but the contractor did not consider that on this rock the small amount of additional fragmentation justified the extra cost of the 60% dynamite.

TNT proved faster than dynamite here in the opinion of the superintendent. The workmen stayed 700 ft. to 800 ft. away while blasting.



★ Cleaning up a sizable rock cut. Newly graded road seen directly behind the shovel

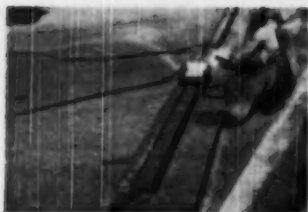
★ Wagon drills were supplied from an air compressor unit mounted on heavy crawler tractor. This special equipment, familiar on Myers jobs during and following the war, was designed to tow wagon drills to pioneer spots otherwise inaccessible in rough country

A small light plant first used to set off the charges burned out the wires and failed to cause an explosion. Blasting batteries, however, proved very satisfactory.

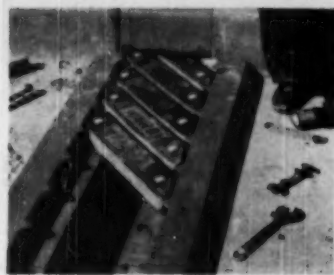
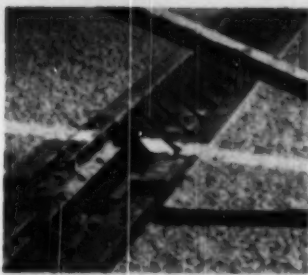
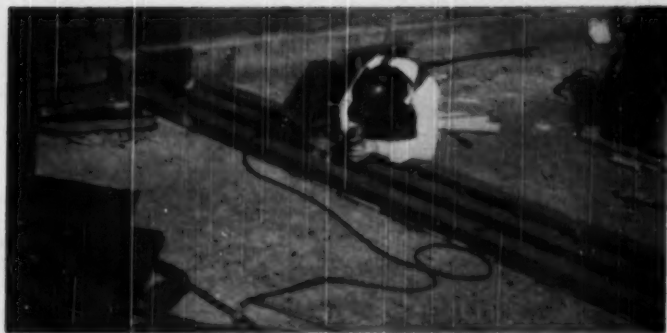
There were 500 holes in the biggest shot, or about 2200 lb. charge. Average heavy shot was 300 to 400 holes. There was very little secondary blasting. In such cases a jackhammer hole and one stick of dynamite were sufficient.

Acknowledgments

The job was under Paul Gibson, project engineer, with W. L. King, assistant district engineer of construction for the Indiana State Highway Commission.



★ End joint during the raising job. Other scenes show how traffic was directed



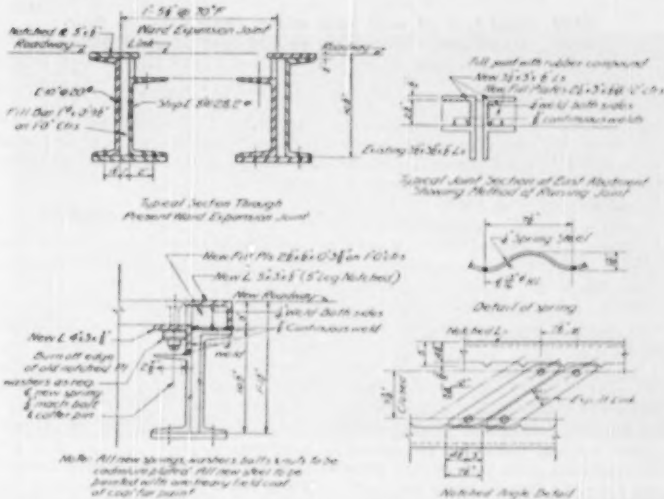
★ Welders at work on a typical intermediate joint. Build-up designed for 3 in. additional pavement thickness

How Bridge Joints Were Raised For Resurfacing

ASIDE from the problem of the added deck weight, resurfacing of bridge floors by means of a bituminous overlay usually entails another problem, namely, that of raising the expansion plates to conform with the new deck level.

Such was the case on the Inter-city Viaduct which connects Kansas City, Mo., with Kansas City, Kansas. This 8,019-ft.-long structure spans an industrial valley and links the central business districts of the two cities. Its 4-lane, 52-ft. roadway has carried extremely heavy traffic, currently averaging 32,000 vehicles daily. The concrete floor, installed in 1936, became worn from the combined effects of chlorides, abrasives and traffic.

Late in 1949 city officials on the Missouri side awarded a contract to Bowen Construction Co. for raising joints and resurfacing. One lane was closed at a time and two welding and acetylene outfits used by the crew to cut joint steel, build up to the new design with 3-in. additional height, and replace the cast steel joint links. The photos and

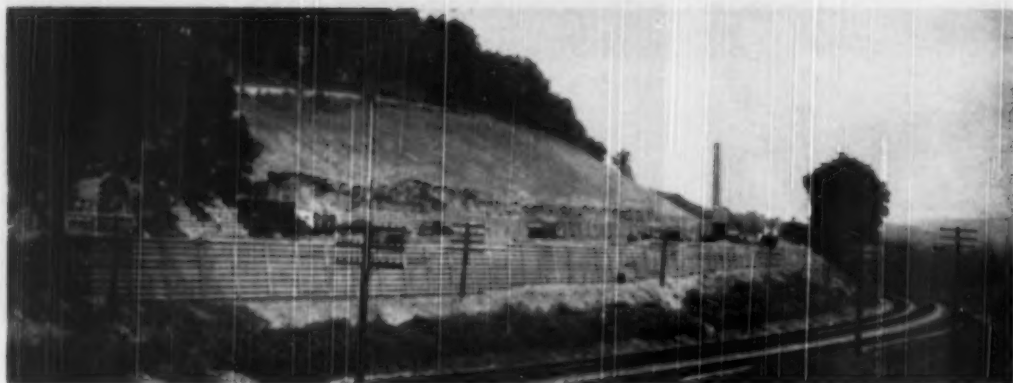


sketch show details of the joint raising and manner of flagging traffic. The project was under immediate direction of Stanley C. Palmer, assistant city engineer. John Maring is city engineer of Kansas City, Mo.

In New Hampshire the mild winter permitted almost continuous progress on the Toll Road near the Coast, and on force-account reconstruction work, while not complicating spring maintenance,

according to L. F. Johnson, maintenance engineer.

Vermont's open weather shortened the winter lay-over period for contractors, but saved the highway department little in maintenance. The winter's maintenance cost will be only about \$50,000 less than normal, reported commissioner H. E. Sargent, who explained that high sanding and chloride costs were experienced, and also an exceptionally bad spring break-up due to autumn rains.



★ View of the nearly-finished walls above and below the road shelf

Long Metal Walls

Serve Binghamton's New Entrance Arterial

3300 lineal feet of wall help widen shelf road to four lanes. Contractor placed up to 230 feet of wall daily using mobile crane

ANYONE who entered Binghamton from the southeast on Route 17, or from the south on Route 11, before the recent improvement, will recall the traffic congestion which existed in the vicinity of the east city limits where the routes joined. In addition to being main truck highways from New York City to the western and central sections of the state, both routes are also heavily traveled by passenger cars.

Even as late as 1948, traffic was forced to use a 2-lane road which was hedged on the south by a railroad and on the north by a hill. During peak traffic periods, the road was loaded to saturation. This was an opportune place for the state to apply its urban arterial Plan, and Binghamton, in fact, became one of the first in a succession of cities in the state selected to receive the benefits of an urban arterial program designed under direction of the New York state department of public works.

The city had planned a new 4-lane location which cut into the hill. The natural hill slope was about $1\frac{1}{2}$ to 1, so the design called for a large concrete retaining wall. However, considering the immense mass of earth to be held back, and the nature of the

foundation, city engineers became skeptical about the use of a reinforced concrete wall, and postponed construction.

Various Designs Studied

Engineers from the Binghamton office of the state department of public works investigated alternate wall designs; in the two-year period to October, 1948, numerous design and cost studies were made. The result was adaption of a metal bin-type retaining wall design, as being economical and also able to adjust itself to the varying forces imposed by the heavy surcharge.

In order to provide sufficient width for a new 4-lane divided highway, retaining walls were required below as well as above the roadway shelf. The lower wall, in addition to supporting the outer side of the highway, was designed to confine the widened fill and prevent it from encroaching on the right-of-way and tracks of the Erie Railroad main line.

The project, which was identified as Broome County Project FAC 48-7, was advertised for bids late in 1948, and Bero Engineering & Construction Company of Buffalo, New York, was awarded the contract.

Wall erection started in June, 1949. The contractor's crew received some preliminary instruction and help from engineers of Armeo Drainage & Metal Products, Inc., the manufacturer of the wall elements. Although hampered by the necessity of maintaining traffic over the road, the contractor was able to erect an average of 180 lin. ft. of wall per day, and a maximum of 230 ft. on one day.

The sites for both retaining walls were machine-excavated to within a few inches of grade. Fine-grading for the base plates was then completed by hand. Excavation proceeded just ahead of the wall crew, so that the earth could be utilized to fill the erected bins. Perforated metal (Hel-Cor) pipe drains were placed behind the wall to intercept excess ground water.

Two Job Stages

Wall erection was performed in two stages. A small crew, working in the storage area, preassembled the transverse sections, which consist of the columns, spacers, and connecting channels. These sections were then trucked to the job and set in place. Another crew at the wall performed the fine-grading, set the base plates, and bolted the stringers in place between the transverse sections. One crane, one power unit, and three power wrenches were used by the crew at the wall. Even though none of the workmen or the foreman had any previous ex-

perience with walls of this type, work of assembly and erection was reported to have progressed economically.

Plans called for about 38,500 sq. ft. of face area and heights ranging from 6.67 ft. to 14.67 ft. Four separate walls totaling more than 3,300 lin. ft. were included, the units being about 2,000 ft., 700 ft., 500 ft. and 100 ft. long, respectively. The 2,000-ft. stretch forms one continuous wall above the highway while the three shorter walls are below the road.

All the walls closely follow the alignment of the road, which curves around the hill. The walls were curved by inserting short stringers in certain bins. This caused the walls to be built in a series of tangents, but, to the eye, they curve gracefully around the brow of the hill.

The new 4-lane highway, completed late last year, has already proved its value in relieving traffic congestion on two important routes. The project benefits both the state and the city of Binghamton in the first successful test of New York's arterial plan.

F. W. Donovan is district engineer for the state department of public works, Binghamton district. C. E. Cunningham superintended the job for Bero Engineering & Construction Company.

Soil-Cement Curing Moisture Loss Tests

Recently announced is Highway Research Board Research Report No. 8-F, "Prevention of Moisture Loss in Soil-Cement with Bituminous Materials," 38 pp., 60c per copy. This publication includes the results of four field experiments conducted by the State Highway Departments of Illinois, Kansas and Nebraska, and by the City of Little Rock, Arkansas, to evaluate the effectiveness of bituminous materials in retaining moisture in soil-cement for seven days following construction. The materials used included a MC-2, RC-1, a negative Oliensis spot MC-3 and an asphaltic emulsion.

The tests reveal that these bituminous cover materials, (1) effectively



★ The contractor assembled transverse wall sections in a storage area and trucked them to the job site, where a motor crane lifted them into place

retained the moisture in the soil-cement, (2) produced inferior surfaces when permitted to penetrate the soil-cement, (3) produced satisfactory surfaces when the penetration was prevented by a suitable moisture in the surface of the soil-cement at time of bituminous application, and (4) additional research is needed for other grades and types of bituminous material commonly used for prime

and tack coat work on bituminous construction.

These data also show that failure to prevent moisture evaporation losses in soil-cement, as occurred on the test sections where no bituminous cover was used, will produce inferior soil-cement surfaces.

Address the Highway Research Board, 2101 Constitution Ave., Washington, D.C.



★ Partly erected wall in foreground; preassembled transverse wall sections seen on the ground along with perforated metal drain pipe



★ The new 4-lane highway into Binghamton complete with flanking walls. Note pleasing appearance of the walls, designed to curve and rise and fall with the roadway

Improving Your Streets —the American Way

Reporting the problems faced by a typical suburban home owner group in getting good streets at a price they can afford

(First Installment of a Series)

An old plan of financing of street improvements that has been in disrepute since the 1929 crash is beginning to come to life again. It is based upon the American way of life, upon cooperative group action, upon initiative, upon the strength of character of the individuals cooperating, upon good ethical standards of the individuals and the group, and primarily upon the desire of individuals to help themselves and each other.

This story is the beginning of a series of articles that will tell just what actions have been taken by this energetic group of typical American citizens whose occupations are all different, varying from the scholarly university professor to the practical machinist, from housewife to salesman. The actions will be reported as they occur. In other words, this project is a sort of guinea pig.

Over the past few years a rural-like subdivision, The Highland Park Woodlands, of the city of Highland

Park, Illinois, a town north of Chicago, has been slowly growing and the people living on some of the streets requested that the city improve them. The streets carry a light traffic, the maximum being in the neighborhood of 250 motor vehicles daily. The average is much less. With passenger vehicles, only service trucks traverse the streets and there are no heavy oil or coal trucks, no heavy trucking of any kind. The most used streets, and the ones on which most of the people in the subdivision live, were coated a few years ago with gravel and some crushed rock. Each year these streets became loblollies, duck ponds, and sink holes. More of the citizens' and taxpayers' money was spent for automobile repairs, extra gas, oil, and tires, than would have been required to pay for surfaced streets over the past years.

The soil is a heavy loam mostly, with silt pockets, and at one place a sandy-clay soil. On the thin sandy-clay soil a considerable number of the trees are white oak with elm and jack

oak also. On the lower areas, elm, box elder, and willow abound. There is a high water table—just under the surface. Drainage is "terrible" and culverts undersized. There are neither storm sewers nor sanitary sewers in the subdivision; residents installed septic tanks. These, of course, tend to keep the ground water level near the surface.

Over the years there would be "a lick and a promise" at street maintenance in the form of running a blade over the surface to smooth up the driving area only. No road cross-section was established and as the graders smoothed the road surface they continued to build ridges along the sides of the wheel lanes that prevented water from flowing off the surface into the side ditches that apparently were dug by spades.

Improvement Association Organized

A few years ago these people organized themselves into the Highland Park Woodlands Home Owners Association. For the past seven months they have been battering away at their problem. Funds collected by the association were spent in good faith in their ignorance of highway problems on crushed stone to fill mud holes and sink holes. Not much could be accomplished with a few hundred dollars with stone at \$3.75 per cu. yd. The money was wasted. The association held meetings, met with the mayor, with the city council, and others. They got nowhere fast. Diligent work, however, on the part of the association's officers resulted in estimates for improvement by four types of surfacing. They had no guidance from experienced road engineers or from the city engineer and consequently the estimates were ambiguous and approximate only. No specifications were prepared, so the figures obtained could be used only as a guide in the group's discussions.

These figures were useful in that it permitted the association members to calculate, approximately, how much the proposed improvements would cost each one. The president's assistant (and the worker of the group) had prepared for each member of the association a slip of paper on which was



★ Why the Highland Park Woodlands group is concerned over its streets is well shown by this recent photo. Note absence of side drainage and failure of subgrade under the crushed stone

noted the number of "units" of benefit to each lot. The "units" were calculated on the basis of the formula recognized by the courts in special assessment work.

In order to bring their problem to a head, at their last meeting, the association asked a bond salesman to explain the market for special assessment local improvement district bonds. Under certain conditions, which seemed favorable in this case, the bonds could be sold. One hundred dollar bonds carrying a four or five percent interest rate could probably be sold at \$90 to \$95 each. No commitments or promises were made but it appears that this long dormant market is opening again.

The bond speaker explained the mechanics of payment to the contractor for doing the work, issuance of bonds, spreading of the assessments on the city's books, and the billing of assessments to property owners.

At this same meeting a qualified road engineer was requested to explain the engineering features involved, drainage conditions and requirements, cross section and side ditch requirements for this particular area, designs for which tentative estimates had been obtained, costs of several types of construction and construction procedures involved. For the surfacing the following four types were discussed:

1. Smoothing up the road and placing 8 in. of gravel thereon. Shoveling out ditches.
2. Grading the road to a ditch drainage grade, installing proper sized culverts, and surfacing with 8 in. of compacted gravel, on which is placed 2½ in. of penetration stone macadam, and two surface treatment courses of ½ in. crushed rock and ½ in. chips on the second course.
3. Asphaltic concrete.
4. Portland cement concrete.

Results of Last Meeting

Prior to this meeting there had been many residents who opposed the improvement work. For seven months they had been discussing their problem in frequent meetings. At the end of this meeting a written vote was taken and a unanimous decision was found for improvement by the second (#2) plan.

Petition to City Council

Subsequent to the action of the meeting, the association prepared and submitted a petition for improvement to the Board of Local Improvements of the city of Highland Park and at this writing signatures have been received for 82% of all property fronting on the proposed improvement. By

law only a majority is required. A good part of these are signatures of non-resident property owners.

Following is the letter that accompanied the signed petition:

"We, the members of The Highland Park Woodlands Home Owners Association, hereby submit this petition for special assessment to improve our roads.

"We fully realize that the City of Highland Park has not built any roads by this provision of the state law for many years because bonds for financing have not been salable at an economical figure. However, Robert Badger of the Tax Bond Company, 141 W. Jackson Blvd., Chicago, Ill. (a reputable concern according to Dunn & Bradstreet, Inc., and Hills Reports, Inc.) has offered to sell the bonds required at 90 to 95 of par should the city levy an assessment for their payment under the present status governing same.

"In choosing the type of road to be built, four propositions were considered. These propositions and the conclusions reached by the group are as follows:

"Proposition # 1

Leave road as it is, and have city spread gravel paid for by individual contributions. *Conclusion:* Since 1948 the members of our association have spent \$2,000, or an average of \$40 per family, for gravel and maintenance of our roads. The city has donated labor for same at an undeterminable cost. During this time we have not improved our lot and have suffered the inconveniences of mud roads. Our cars have been towed out of the mud, personal services have been threatened and, at times, curtailed during bad seasons. Our properties have been unduly endangered by road conditions which would not permit passage of fire trucks in an emergency. Police protection has undoubtedly been hampered because of the reluctance to chance patrolling under the severe road conditions existing.

"Further, fast ambulance service would be impossible from the standpoint of getting stuck, and also the undue roughness of the roads would definitely affect an ailing passenger. The residents have been subjected to dust almost beyond human tolerance. The dust is not only unhealthful, but its abrasive nature has deteriorated shrubbery, homes and furnishings.

"The roads have reached such condition that collection of funds for the present system of maintenance is not only difficult but it would be impossible to collect enough by voluntary contribution to make the necessary repairs. Money collected this spring is far from sufficient and the work which our good city is doing will only be a token in comparison to the overall problem.

"Proposition # II.

A good 8-in. compacted gravel road with labor donated by the city to help

maintain same. *Conclusion:* A good gravel road for our subdivision was estimated to cost \$12,000 without provisions for drainage, mail box approaches, driveway entrances and culverts. Collecting this amount of money by contribution would be impossible and an undue strain would be worked on the residents since there would be no incentive for owners of vacant property to participate. Building a good gravel road would, at best, be a temporary stop gap as the road would deteriorate rapidly without several gradings per year. The dust problem would still be with us and its maintenance would depend on further contributions from residents and further donations of labor by the city.

"Proposition # III.

Bituminous concrete or concrete with storm sewers, curbs, gutters and city maintenance. *Conclusion:* Either bituminous concrete or portland cement concrete would cost about the same. Estimates run, roughly, about \$100,000 to \$125,000. Such a figure is approximately 25% of our total assessed valuation, making such a large scale operation economically intolerable. This amount cannot be financed because our bond source is unable to sell this many bonds. Further, if such bonds were to be sold at the low figure of 90 of par, it would cost the residents \$10,000 in discount, plus interest.

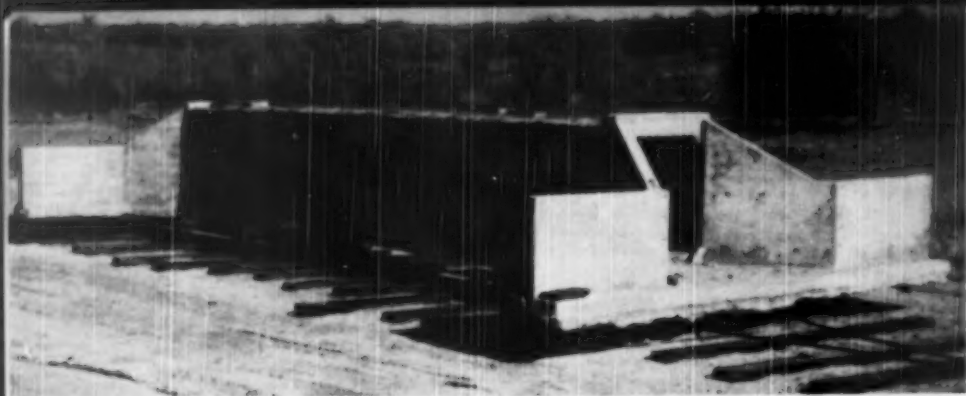
"The maintenance on such a street would be borne by the city. However, the funds for such work are not available to the city under the present low tax rate. Such a huge investment would thereby be unduly jeopardized and make it a poor risk for the residents and the bondholders.

"A majority of the residents are not in favor of such a type of road from the standpoint that they desire a rural atmosphere which would be dissipated by such an improvement.

"Proposition # IV.

A 6" to 8" compacted gravel road with a 2-in. to 2½-in. asphalt penetration surface, adequate drainage, mail box approaches, driveway entrances and proper culverts. Such a road to be paid for by special assessment and maintained either by special assessment or by residents' contributions to the association. *Conclusion:* Such a road as outlined in attached specifications is estimated to cost from \$25,000 to \$30,000 by four reputable contractors. This figure is in the realm of possibility from the standpoint of financing, road service, and maintenance. It provides proper drainage by ditching, new culverts for flood loads, and proper culverts for driveways. It goes one step further than gravel by providing a positive bond so that repeated gradings are not necessary and the general road surface is held in place. It eliminates the dust problem and provides an all weather surface capable of

(Continued on page 62)



★ The culvert on the move, axis parallel with the centerline of the new highway grade

Moving Day

for 160,000-lb. Concrete Cattle Pass

A FIVE-BY-SIX foot concrete cattle pass, 60 ft. long, found itself classed as "traffic" on a Texas highway recently. The maintenance forces of the Texas highway department, Bryan district, moved this culvert about 4,000 ft. down the road to a new location. Considering the 80 tons dead weight, the task was accomplished with surprisingly little fuss.

It all happened because a landowner along a road job was promised a stock pass as part of a right of way deal. Through some misunderstanding or other, when the structure had been completed, the farmer claimed it was built in the wrong place. He wanted it three-quarters of a mile down the road instead. After a great deal of discussion, district engineer John E.

Blair, feeling that it would be good "public relations," decided to move the box bodily into the desired position.

The road in question is a section of state route 90 between Navasota and Brenham, Texas. While the weight of the load to be moved was without precedent in this part of Texas, there was no problem of traffic interference since the entire project was on a new location. Mr. Blair describes the moving operation as follows:

"We first constructed two sleds of structural steel shapes, one sled to be placed under the barrel near each end. The runners of these sleds consisted of 12-in. channels with flat face down. The cross pieces on which the culvert was to rest consisted of heavy pieces of timber. Needless to say, they were

very solidly constructed.

"The culvert had not been back-filled, and it did not sit down in the bottom of a stream, but rather well up on the slope of the hill, so it was not necessary to raise it out of any considerable hole. The same condition prevailed at the destination, which simplified the problem very greatly.

"We jacked the culvert up with about eight large jacks, and simply slipped the sleds under it. The sleds rested on some salvaged creosoted timber stringers, and the culvert was lashed down with chains and load binders. The timber planks were kept greased, and the culvert was led along with winch lines.

"After we had turned the culvert lengthwise of the road, we pulled it possibly a hundred feet at a time, and then shifted our timbers ahead. There was no difficulty at all in making it move. The biggest job was in getting it turned and lowered to its bed at the end of the run.

"The cost of the moving was about a thousand dollars, a saving of a thousand dollars over the cost of a new structure. The job took four days."

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Start of Trip. Culvert up out of shallow trench, and being slewed around



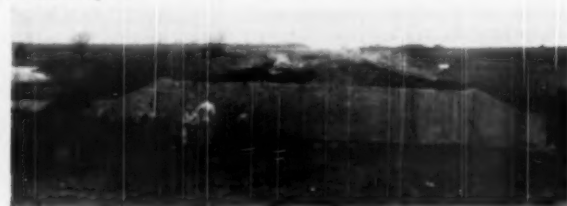
On Its Way. Tractor and two trucks performed the towing, using winch lines



Near Destination. A slightly uphill drag, as seen from the rear



New Location. Again cross-wise with the road and ready for backfilling



Subgrade Soil Exploration for Highways

An excellent summary of a new branch of highway engineering which is gaining rapidly in use. Use of agricultural soil survey maps, geologic maps, geologic data and aerial surveys is discussed

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Soil Exploration for Highways

TODAY, an engineering soils laboratory and equipment for making field explorations are important facilities of most highway departments in the United States. The need for soils work in location, design, and construction requires little emphasis. Rather, emphasis should be placed on the use of available information and new techniques for evaluating soils for highway purposes. Furthermore, stress must be placed on the development and use of short-cut methods for obtaining soils information, for eliminating useless testing, and for developing pave-

ment designs to fit major soil-area boundaries rather than political subdivisions.

It is the purpose of this paper to discuss the use of various types of maps and information that can be used in making soil explorations for highways. Specifically included in the discussion is the use of agricultural soil survey maps, the use of geologic maps and geologic information in general, and the use of aerial photographs in the preparation of highway engineering soil maps. The scope of the paper does not include information on exploratory procedures, i.e., core drilling, seismic, geologic physical and other procedures.

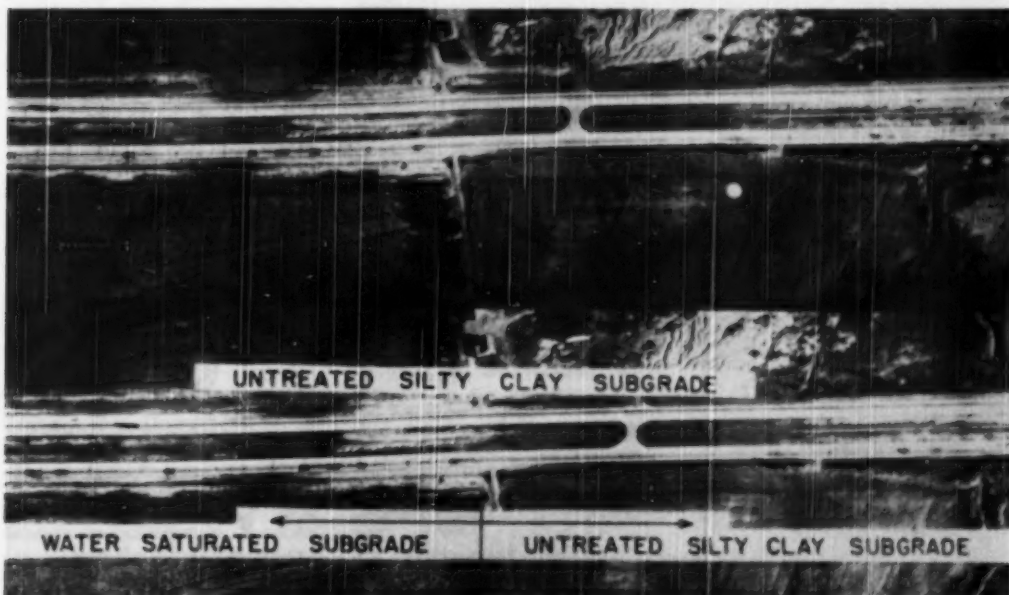
Origin and Distribution of Soil

For the most part, the land surfaces of the earth are covered with a mantle of soil and rock debris of varying depth. These materials were developed originally from the disintegration and decomposition of bedrocks. (1)

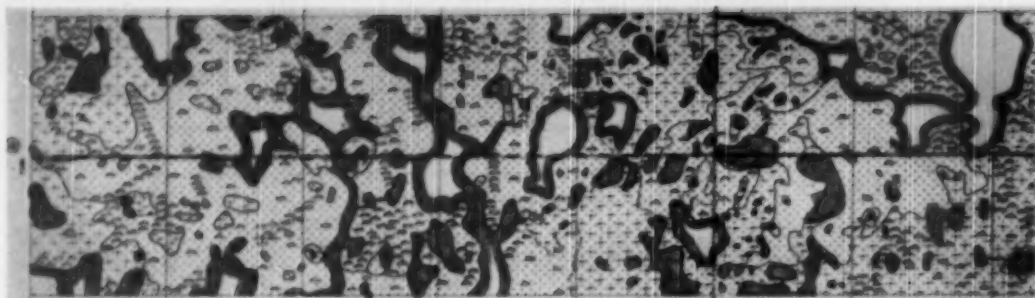
Since bedrocks vary widely in mineralogical and chemical characteristics, it is apparent that the soils which have been developed from these rocks also vary in their physical mineralogical, and chemical characteristics. Rocks are classified on a general basis as igneous, metamorphic, or sedimentary. Each of these three groups may be subdivided further. For instance, sedimentary rocks consist of three main classes, shales, limestones, and sandstones.

The depth of the soil mantle in an area where the soil has been developed in place from bedrock materials, varies considerably. The reason for variation includes not only the character of the bedrock material, but also the factors of climate, vegetation, topography, and time of weathering. (2)

Not all the land surfaces of the earth are mantled with soils and rock debris developed in place. A large percentage of the surface materials have been transported either by ice, by wa-



★ Low altitude strip map showing pavement conditions. This type of photography has promise for varied highway uses, including the preparation of soil survey maps



SAND (PROFILES No. 1 & 2)



HIGHLY ORGANIC TOP SOIL
(PROFILES No. 3, 4, & 5)



SAND DUNES (PROFILE No. 1)



MUCK (PROFILE No. 6)

ter, or by wind.

In ice transportation, the surface soils, and frequently some of the underlying rock, are pushed ahead or are intermixed with the ice as the glacier moves forward slowly. When these glaciers are of the continental-ice-sheet type, enormous quantities of debris can be transported from one locality and deposited in another. All of the continents of the world have been glaciated to a considerable degree—the continental ice sheets of North America having extended well into the northern tier of states in the United States. (3)

The character of the soils which have been transported by wind is in striking contrast to the character of the rock-soil mixture of glacial drift. Wind is selective in the size of particle it carries, and, therefore, wind-deposited materials are generally quite uniform in gradation and in other physical properties. Two classes of wind-deposited material are widespread, wind-deposited dune sands (4) and windblown silts loess (5, 6).

Vast regions of all the continents contain surface materials which have been deposited by water. Fenneman (7, p. 259) states that the granular deposits of central Washington occupy an area of 1000 square miles. Marine deposits occur in coastal-plain regions such as those adjacent to the Atlantic and Gulf in the United States. Continental deposits are widespread also in their occurrence. Water-deposited sands, silts, clays, and some gravels constitute the mantle of the Great Plains of the United States, while the valley sections of the Basin and Range region of Nevada, Utah, and other western states are composed entirely of valley-fill material deposited largely by the action of running water. The textures of water-deposited

materials are generally granular, although silts and clays are to be found extensively.

Outstanding Topographic Features

The type and scope of soil exploration needed to effect proper site selection and highway or railroad location is critically influenced by the outstanding topographic features of the soil regions. For purposes of site selection, location of highways, railroads, and for purposes of soil-survey information, the outstanding topographic features of each soil region becomes an important item (8). These features are important, be the method of survey one of "on-foot" inspections, use of agricultural soil survey maps, application of geologic maps, utilization of topographic maps or the use of airphotos for interpretation of topographic features (9).

In bedrock regions where the soil mantle consists of residual soils (developed from bedrocks in place) both the texture of the rock and the tilt of the strata are factors influencing topography. Texturally, rocks can be considered under the main groupings of igneous, metamorphic, and sedimentary. Each of these types contains a wide variety of textural materials as well as a wide variety of landforms. Igneous rocks, for instance, may vary from horizontally-bedded lavas and basalts to volcanic plugs and cinder cones. Metamorphic rocks include such types as schist, gneiss, marble, and slate. The topography of a region of metamorphic rocks, such as the Piedmont, is undulating to rough. These residual soils are frequently deep and thus the slopes are, in general, soft. From the standpoint of areal distribution, sedimentary rocks are outstandingly important in the continental

★ Soil strip map. This one covers an Indiana highway project and was developed from geological, pedological and airphoto information

United States. Sedimentary materials can usually be grouped under the headings of sandstone, limestone, and shale. When rock materials are tilted or deformed, the topographic features are usually changed markedly.

The landforms of a glacial drift region are entirely different than those of the bedrock regions. The predominating feature of large glacial regions is the till plain—usually a near-flat plain, broken only by drainage ways and occasionally by moraines, kames, and eskers. Lacustrine (glacial lake-bed) deposits are important topographic features in glacial regions, as are peat bogs and muck deposits.

Water-deposited materials, likewise, have characteristically flat topography, as is evidenced by the areas of the Atlantic and Gulf Coastal Plains, most sections of the High Plains, and the valley sections of the Basin and Range Province. Textural variations are to be expected in water-deposited materials, the coarser-textured materials having been deposited under conditions of higher-water velocity than the finer-textured materials.

Wind-blown sands occur prevalently as dunes while in the case of wind-blown silts the undulating to slightly hilly, softly-rounded features with semi-parallel ridges are outstanding topographically.

Soil Profile Development

We have observed that soil is formed from rock by mechanical disintegration or by chemical decomposition, or both. Disintegration is accompanied by freezing and thawing, the action of running water, glaciation and other similar processes. Decomposition on the other hand is accompanied largely through oxidation or hydration. The combined mechanical and chemical process is called weathering.

As previously inferred, surface soils are composed of two general types, residual—those formed from insoluble residue of weathered rocks in place,

and transported—those soils which have been moved by wind, water, or ice. Both the residual and transported soils are constantly undergoing changes in physical and chemical properties as a result of weathering. The process of freezing and thawing, and the leaching of the top soils through the removal of soluble salts and colloids, plus the deposition of these materials in the subsoils tends to develop layers or horizons. The complete cross section of a soil material from the surface to its parent material is called the soil profile.

Important among the factors influencing the development of the profile is the parent material. Topography also plays a vital part in soil-profile development, since surface waters have more opportunity to permeate through a soil when the topography is flat or depressed than is true on steep slopes. Conditions favoring permeation produce a deeper, leached surface horizon (the eluvial or A horizon—commonly referred to as the top soil), and a correspondingly deeper zone of accumulation in the illuvial or B horizon. This horizon is also frequently referred to as hardpan or claypan, and frequently is the immediate reason for the occurrence of a perched water table. The unweathered parent material is commonly referred to as the C horizon. Highway pavements which are constructed in cut sections through A, B, and C horizons are invariably subjected to a wide range of subgrade support and variations in subgrade-drainage characteristics, which accounts for many of the failures occurring in cut sections (10, 11).

Soil Surveys and Mapping Techniques

Other important factors in the development of soil profiles include climate, vegetation, and the time of the weathering. The climatic influence is apparent, both from the standpoint of disintegration of rock materials and the rate and magnitude of profile development. Vegetation has its influence in the accumulation of organic materials, the addition of organic acids to the soils, and the bringing of plant nutrients from the lower layers to the upper ones. The age factor, although important in evaluating the profile characteristics of one soil area against others, is more or less of academic importance from the standpoint of engineering properties of soils in small geographic units. In drift materials the age factor can be evaluated. For instance, Wisconsin drift soil profiles are seldom in excess of 3.5 to 4 ft. in depth, while in contrast, profiles of Illinoian drift soils may be as much as 12 to 15 ft. in depth.

The purpose of the highway subgrade soil survey is to procure information which can be used in design and construction (12). To be of maximum use the soil survey should present data which can be used in evaluating drainage needs, requirements of subgrade treatment (13), information which can be used in design to minimize or eliminate foundation failures (14), landslides (15), frost heaves (16), and embankment failures (17).

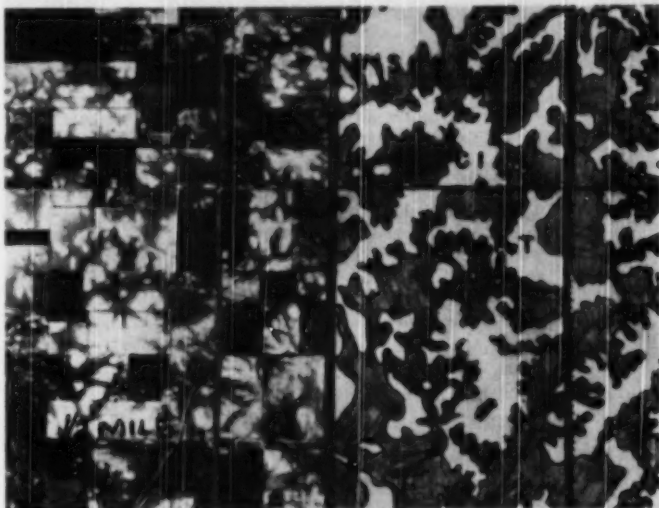
A knowledge of the soil profile can be used to advantage frequently in establishing the final location of the road, (both vertically and horizontally), and in the selection of earthwork for subgrade and for fills. The

survey should be of practical use in the actual design of the roadway section, and even in the selection of the type of road surface (18).

A great deal of preliminary work can be done in the office by a study of topographic maps, geological maps, soil survey maps, and contact airphoto prints. By the use of such data, general soil areas can be bounded, the characteristics of the materials predicted, and most of the exploratory field work planned. The general characteristics of the location can often be estimated from topographic maps with a reasonable knowledge of landforms.

Geologic Maps:

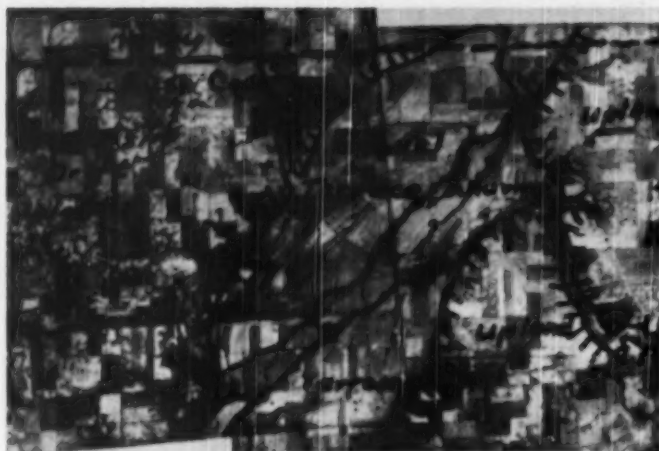
Most sections of the United States



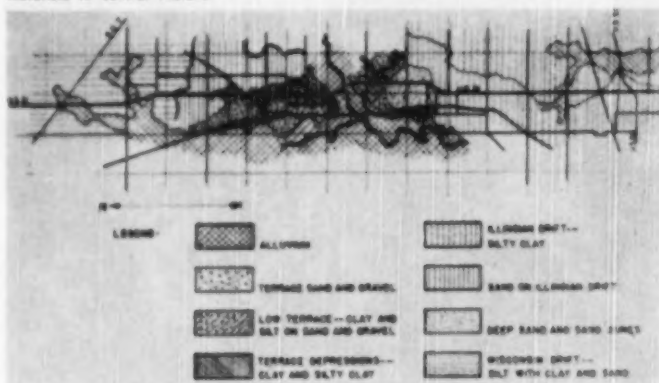
★ Aerial photography (left) and engineering soil map (right) made from the aerial view



★ An area in Northern Mississippi, Abandoned stream channel clearly shown. This photo shows method of deposition of materials indicated as "Mississippi River Alluvium"



★ Soil boundaries are marked on this air photo showing Wisconsin drift materials in central Indiana



★ Strip map of engineering soils for field survey of highway performance, U. S. 31 between S. R. 7 and U. S. 50 in Indiana

have been surveyed, at least in reconnaissance form, and, as a result, various types of geological maps have been prepared. The usefulness of the geological map in the soil survey will depend upon the type and accuracy of the available mapping. In bedrock areas, such as in most of Pennsylvania and West Virginia, geological maps can be used to great advantage (19). Maximum usefulness of this type of information will depend somewhat upon the background and proficiency of the observer in interpolating the relation between the geological information presented and the textures of the rocks to be encountered in the specific site being examined. The same type of map is useless in making soil surveys in drift-covered or loess-covered regions. However, some detailed mapping of drift deposits has been accomplished, and where these detailed maps are available, they can be used to considerable

advantage. A new type of map such as that made for Smith County, Kansas (20), by the Geological Survey in 1948, showing the distribution of constructional materials in this area, bears promise of being exceptionally useful in soil survey work. In summation, geological maps are available for most states, and these maps can be used with various degrees of effectiveness depending upon the locality and the quality and type of map available (19).

The geologic map of the state of Washington can be used to advantage in developing the major boundaries of soil materials. The state contains residual soils developed from many types and classes of rocks; wind-deposited silts and sands; and of various types of water deposited materials including both sands and gravels. Glacial drift and outwash materials are abundant in the northern portion and in the Puget-Sound region.

Agricultural Soil Survey Map

Pedologic Maps:

All of the factors of soil formation processes are considered by the pedologists in the development of the agricultural soil survey map. It follows, therefore, that the well-made soil survey map can be aptly used for engineering purposes. Among the advantages of such maps is the fact that the position, the soil profile, the structure, and other natural features are embodied in the soil classification established by the map.

A good soil-survey map in the hands of an individual who is proficient in interpolating the relation between soil survey nomenclature and engineering characteristics of the soils can be used to determine a high percentage of all the information needed. However, a nominal number of field checks is always required. These checks are made in areas representative of the various recognized soil types, and in areas of transition of soil types, and in locations where the pedologic map affords inconclusive evidence and description.

Disadvantages of the system include the fact that the nomenclature used depends upon type-locality names rather than engineering or geologic (21) names. Also slight variations in even top soil characteristics are of sufficient agricultural importance to warrant the use of a separate name in order to record all variations on the soil survey map. Since top soils are generally not used as a part of the sub-grade or embankment for highway and airport building, agricultural soil survey maps are frequently prepared with greater detail than is necessary for engineering soil survey purposes. Considerable progress has been made in recent years in adapting the pedological maps and procedures to engineering usage. Among the states which favor this method of making highway soil surveys are Michigan (22), Missouri (23), and North Carolina. Indiana has developed considerable information on the correlation between the pedologic nomenclature and the engineering characteristics of Indiana soils (21).

A number of excellent soil survey maps have been prepared for several areas in Washington. Some of these are reconnaissance in nature while others present the soils data in considerable detail.

Airphotos—Interpretation of Soil Patterns:

The use of aerial photographs has received increased attention for the past 30 years in the matters of obtaining location information for airports, highways, railroads, etc.; for erosion, drainage, and flood control work;

hydro-electric studies; and for obtaining boundaries for land surveys. Since about 1940, rapid advances have been made in the use of aerial photographs for evaluating soil textures, locating construction materials, and making detailed engineering soil maps for highways and airports (31). Aerial photographs have been used to advantage by pedologists in the development of soil survey maps (32), while geologists have used aerial photographs for many years for general layout and as a complementary aid to field programs. Use of aerial photographs for engineering soil mapping has considerable potential (33), in all regions including those areas which are relatively undeveloped and unmapped (34), as well as areas where reasonably good pedological and geological information is currently available. However, an understanding of landforms and the elements of pedology and geology are fundamental to efficient aerial photograph interpretation.

The aerial photograph records, in effect, the sum total of all the natural influences which act to develop rock and soil forms. Prominent landform characteristics of various materials give valuable clues as to the overall situation, and detailed study of the aerial photograph with attention to such items as color tone, drainage characteristics, vegetative cover, land use, and erosion completes the analysis (35, 36).

There are three main types of photographs which can be used in aerial-survey work, namely, tri-metrogen, vertical, and continuous strip. The tri-metrogen photographs give coverage from horizon to horizon (37), and are useful in reconnaissance work. The vertical photographs are the type most commonly employed for soil-survey work (38). The continuous strip photograph is a development which bears promise of being of considerable use for making various types of highway surveys, including soil surveys (39). Fig. 10 is a low-altitude strip-photo of an Indiana highway.

The technique of airphoto identification of soils and rocks was developed by studying contact airphoto prints in the laboratory and making intensive field checks to establish the ground situation responsible for the various tones and markings shown on the photographs (35). The accumulation of these data has resulted in semi-standardization procedures, and, as a result the amount of field work required for airphoto analysis is gradually being diminished. However, in initiating airphoto-interpretation programs, the procedure of laboratory study, followed by extensive field checking, is

still recommended. Through this method, observation of soil-texture variations within the soil profile, ground-water conditions, and topographic position can be correlated with the pattern developed in the aerial photograph. After ground reconnaissance has established the reasons for the detailed markings on the aerial photograph, similar airphoto patterns of other regions—even on another continent—will indicate similar or identical soils. Thus the process of identification through aerial photographs for soil survey purposes becomes one of accumulating field data which shows the reasons for the markings on the photograph. The process then becomes essentially one of "finger-printing."

The airphoto appearance or pattern is studied on the basis of the "elements of the pattern." Probably the most important of these is the topography of the deposit including its relationship to the surrounding terrain (40). Variations in the drainage patterns are of importance almost equal to that of the topographic position (41). These patterns are easily distinguished by changes in vegetation, by changes in topography which indicate depressed channel-ways, and by the change in photo tone. Erosional characteristics are of importance in identification in many soil regions, as is the type of native vegetation, the type of an agricultural land-use pattern, and other man-made features.

Aerial photographs can be used with speed, accuracy, and confidence in establishing boundaries between areas of dissimilar soils.

Also, variations between reasonably similar soils can be detected by inspection of aerial photographs, either by direct reading or by inference. Granular materials are usually easy to identify primarily because of their occurrence in landforms such as kames, eskers, terraces, beach ridges, and sand-dunes (42). In bedrock outcrops, various textures and materials can be identified by landforms characteristic of the texture. From the standpoint of constructional materials, the identification of such rock as limestone and trap rock is frequently extremely important, the former frequently developing a "sink-hole pattern" with the latter frequently occurring as long, moderately high rock ridges.

Contact aerial photographs can be used in the development of soil survey information in three different ways. Index sheets and a complete set of stereo contact prints of an area, such as an entire state, can be employed to develop a very accurate, but general, engineering soils map. Such a map will show the major areas of parent materials and textures. For instance, in

bed-rock material, boundaries can be developed by showing the shales, the limestones, the sandstones, while in drift areas the map will show such features as lake-beds, muck deposits, sand dunes, moraines and the important gravel deposits, which occur in kames, eskers, terraces, and outwash plains.

If it is not feasible to develop an engineering soil map for a large region, the contact aerial photographs can be obtained for a county, or for even a smaller geographic area. The engineering soils map can be prepared for a specific highway project in the form of a strip map. Greater detail can be given on this type of map than on the general engineering soil map of a large area because of the more favorable scale. It is important that ample provisions be made for field checks in the development of engineering characteristics of the soils being studied in the use of either of these two procedures for soil mapping.

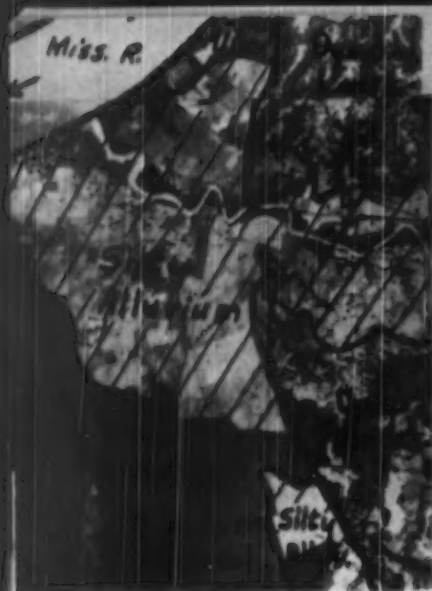
Tied with Field Work

In the third instance, contact aerial photographs can be used in conjunction with field work to develop the customary type of soil-survey data. Detailed study of the aerial photograph of the site in question can be used to establish the exact location for field investigations and thus eliminate a great deal of drilling, sampling, and laboratory testing.

Engineering Soil Maps:

Engineering soil maps can be prepared from certain types of geological maps as well as from agricultural-soil-survey maps. Likewise soil maps for engineering use can be compiled from aerial photographs. In Fig. 17, soil boundaries have been marked on an aerial photograph covering some Wisconsin-drift soils in central Indiana. The material marked "Wisconsin Drift Uplands" consists of materials of clay-like characteristics and well-developed but shallow soil profile. The area marked "terraces" are granular in character and are therefore well drained. These areas are important from the standpoint of location of highways, airports, railroads, etc. and they frequently constitute important areas for the location of constructional materials.

Fig. 18 is a marked up aerial photograph showing plastic water-deposited clays along the Mississippi River bottoms in Mississippi which patterns are in contrast to the deep deposits of wind-blown silt which form a continuous belt from the Ohio River to New Orleans along the east bank of the Mississippi River. Fig. 19 is to be compared with Fig. 18. The influence



★ Strip map prepared recently for use by the state highway commission of Indiana, in connection with a current highway project. (Courtesy R. D. Miles, Joint Highway Research Project, Purdue University)

★ The silty alluvium, shown in portion of this airphoto contact print, is in striking contrast with adjacent deep loess and materials of the Mississippi River flood plain

of the recently deposited silt, derived from the adjacent uplands, is indicated in the area on the aerial photograph marked as "Silty Alluvium."

Presentation of information with respect to the engineering-soil survey is shown in Figures 20 and 21. This type of soils strip map can be compiled from pedological or geological maps or from aerial photographs. This type of map is practical for highway location purposes, for purposes of establishing design in relationship to the engineering characteristics of the soils, and for locating present information on location of construction materials.

References

- Emerson, Frederick V., "Agricultural Geology," John Wiley and Sons, Inc., New York, 1928.
- Jenny, Hans, "Factors of Soil Formation," McGraw-Hill Book Company, Inc., New York, 1941.
- Bretz, J. H., "The Age of the Spokane Glaciation," Amer. Jour. of Sci., Ser. 5, Vol. 6, pp. 535-542, 1924.
- Bagnold, R. A., "The Physics of Blown Sand and Desert Dunes," William Morrow and Company, New York.
- Krynine, P. D., "Age of Till of 'Palouse Soil' from Washington," Am. Jour. Sci., Ser. 5, Vol. 33, pp. 295-316, 1937.
- Bryan, Kirk, "The 'Palouse Soil' Problem," U.S.G.S., Bulletin 798-B, Washington, 1927.
- Fenneman, Nevil M., "Physiography of Western United States," McGraw-Hill Book Company, Inc., New York, 1931.
- Minde, Norman E. A., "Geomorphology, the Evolution of Landscape," Prentice-Hall, Inc., New York, 1943.
- Jenkins, D. S., Civil Aeronautics Administration, Belcher, D. J., Gregg, L. E., and Woods, K. B., Purdue University, "The Origin, Distribution, and Airphoto Identification of United States Soils," Technical Development Report No. 52, May 1946, U.S. Department of Commerce, Civil Aeronautics Administration, Washington, D. C.
- Woods, K. B. and Gregg, L. E., "Pavement Performance Related to Soil Texture and Compaction," Proceedings of the Highway Research Board, Vol. 24, pp. 428-449, 1944.
- Sweet, H. B., and Woods, K. B., "Map-cracking in Concrete Pavements as Influenced by Soil Textures," Proceedings of the Highway Research Board, Vol. 26, pp. 286-301, December 1946.
- Woods, K. B., and Litchner, R. R., "Soil Mechanics Applied to Highway Engineering in Ohio," Bulletin No. 99, Ohio State University, Vol. VII, No. 2, July 1938.
- Woods, K. B., "The Influence of Subgrades and Bases on the Structural Design of Concrete Pavements," (Paper in preparation for American Concrete Institute).
- Burton, V. R., "Fill Settlement in Peat Marshes," Public Roads, Vol. 8, No. 12, February 1927.
- Ladd, George Edgar, "Landslides, Subsidence, and Rock-Falls," Bulletin, American Railway Engineering Association, Vol. 37, No. 377, July 1955.
- Taber, Stephen, "Freezing and Thawing of Soils as Factors in the Destruction of Road Pavements," Public Roads, Vol. 11, No. 6, p. 113, August 1930.
- "Compaction of Earth Embankments," Arranged by Harold Allen, Proceedings, Highway Research Board, Vol. 18, Part II, pp. 142-181, December 1938.
- Muir, Levi and Hughes, William F., "Soil Survey Practice in the United States," Proceedings, Highway Research Board, Vol. 19, p. 467, 1939.
- "Geology Map of the United States," U.S.G.S., Washington, 1932.
- Byrne, Frank E., Houston, Max S., and Mudge, Melville B., "Construction Materials in Smith County, Kansas," U.S.G.S., Circular No. 28, November 1948.
- Belcher, D. J., Gregg, L. E., and Woods, K. B., "The Formation, Distribution and Engineering Characteristics of Soils," Engineering Bulletin, Purdue University, Lafayette, Indiana, Res. Ser. No. 87, 1943.
- "Field Manual of Soil Engineering," Michigan State Highway Department, September 19, 1946.
- "Soils Manual," Missouri State Highway Department, Jefferson City, Missouri, June 1941.
- Kocher, A. E. and Strahorn, A. T., "Soil Survey of Benton County, Washington," U.S.D.A., Washington, 1919.
- Van Dyne, Cornelius, Agee, J. H., and Ashton, Fred W., "Soil Survey of Franklin County, Washington," U.S.D.A., Washington, 1917.
- Wildermuth, Robert, et al., "Soil Survey of Kibap County, Washington," U.S.D.A., Washington, Series 1924, No. 12, 1928.
- Mangum, A. W., Van Dyne, Cornelius, and Westover, H. L., "Soil Survey of Quincy Area, Washington," U.S.D.A., Washington, 1913.
- Van Dyne, Cornelius, Mortlock, H. C., Heck, A. F., and Alvord, E. D., "Soil Survey of Spokane County, Washington," U.S.D.A., Washington, 1921.
- Van Dyne, Cornelius and Ashton, Fred W., "Soil Survey of Stevens County, Washington," U.S.D.A., Washington, 1915.
- Kocher, A. E., "Soil Survey of the Wenatchee Area, Washington," U.S.D.A., Washington, 1922.
- McCullough, C. R., "The Preparation of Engineering Soil Maps from Aerial Photographs," 3d Annual Florida Highway Conference, 1949.
- Bushnell, T. M., "Aerial Photography and Soil Survey," Proceedings, American Soil Survey Association, Bulletin X, pp. 23-28, 1929.
- Frost, R. E., "The Use of Aerial Maps in Soil Studies and Location of Borrow Pits," Proceedings, Kansas Highway Engineering Conference, pp. 58-82, July 1, 1946.
- Woods, K. B., Hittle, Jean E., and Frost, R. E., "Correlation between Permafrost and Soils as Indicated by Aerial Photographs," Proceedings, Second International Conference on Soil Mechanics and Foundation Engineering, pp. 321-324, June 1948.
- Frost, R. E., and Woods, K. B., "Aerial Photographs used for an Engineering Evaluation of Soil Materials," Proceedings, Second International Conference on Soil Mechanics and Foundation Engineering, pp. 321-324, June 1948.
- Belcher, D. J., "The Engineering Significance of Soil Patterns," Proceedings, Highway Research Board, Vol. 23, pp. 569-598, 1943.
- Mintzer, Olin Wesley, III, "Airphoto Analysis of the Yukon-Beaver-Circle Area, Alaska, For the Selection of a Fighter Strip," Thesis, (Submitted to the Faculty of Purdue University in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering), June 1949.

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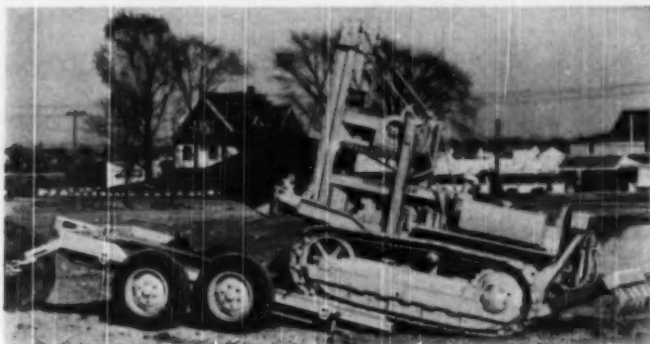
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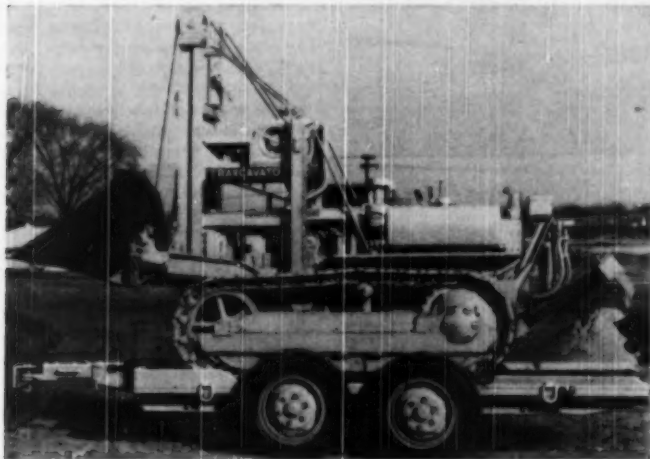
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KNOCKIN' Out the Yardage

Train Loading Steps up Levee Scraper Job in Missouri

The advantages of train loading, in which scraper units help each other as well as receive pusher service, is well demonstrated on a current levee job in Missouri. The project is a section of Missouri Basin tie-back levee (Sec. 20 of Unit L550) near Rockport, Mo. The agency is the Corps of Engineers; the contractor, J. D. Armstrong Company, Inc., of Ames, Ia. The project's purpose is to aid in protecting valuable agricultural land by holding back Missouri River flood water and by creating a basin for retarding local storm water which might enter the Missouri from Rock Creek.

Equipment Analysis. This job, when analyzed, lent itself to the use of tractor and scraper operations as well as a certain amount of dragline excavation. The work extended 3 miles on either side of Rock Creek. Items included 49 acres of clearing and grubbing, 750,000 cu. yd. of sandy clay excavation, and five relatively small drainage structures. The contractor decided on two spreads



★ Train-loading operation on the Armstrong project. International TD-24's with Bucyrus-Erie 8-170 scrapers (15-yd.) working in sandy clay, with TD-24 pusher. 30 to 45 seconds loading time



★ Five simultaneous operations: rolling new levee grade; pusher backing in "high"; scraper turning with load (left background); dozer removing old levee bank (rear center); dragline mucking from Rock Creek



★ J. D. Armstrong, head of contracting firm, delivering replacement parts to foreman Harlan Nibe in his private four-seater

bank job is under Roy Cheek with Lawrence W. Croat as mechanic; the right side, Harlan Nibe, with Ivor DeBruyn as mechanic.

Fleet Make-up. One crew is working with 5 International TD-24 tractors and 2 International TD-18 with bulldozer, and a Koehring dragline.

These crews are working 10 and 11-hour shifts, six days per week. The two draglines are being used exclusively for handling all wet and under-water material, thus taking the tractors and scrapers out of boggy conditions. This dragline management policy assures peak production for tractor and scraper units.

A feature of which the foremen are continually conscious is the train-loading operation of tractors and scrapers. Under such procedure all units help each other load as well as being assisted by a crawler pusher.

Train loading, according to contractor J. D. Armstrong, increases

of tractors and scrapers with identical subsidiary equipment. Each spread had 4 tractors with scrapers, 1 crawler tractor for pusher, 1 with a dozer, and 1 with a two-section sheepsfoot roller, as well as one ¾-yd. dragline.

A ¾-yd. dragline for each spread, instead of one 2 or 2½-yd. machine, was chosen because of these factors: (1) greater mobility, as no crossings were available from one side of the creek to the other; (2) ground conditions were such that ¾-yd. draglines could be used without floats or mats most of the time; and (3) two machines could produce more yardage for the investment in comparison to one larger machine.

As a consequence, the job was divided into two adjacent operations separated by water, with identical equipment all around. The equipment and work carried on along the left

efficiency of tractor-scraper operations about 15% to 20% and is easier on the equipment. Train loading is possible without damage to the equipment due to the development of synchromesh transmissions such as those installed in new model tractors, Armstrong said.

Output High. The International tractor-scraper units have averaged 4½ min. per load cycle on an average haul of 750 to 1,100 ft., getting 12 cu. yd. struck per load. Loadings during one week ranged from 511 to 635 per day of 11 hours worked.

Has Own Engineer. J. D. Armstrong Company's engineering on the project is being handled by Seth Ryan, graduate civil engineer. Ryan's work consists of staking the entire job and laying out all cross-sections before and after work, as well as computing yardages produced on a weekly basis.

Background. Stressing safety as a big factor of his success in the heavy construction business, Armstrong, who practices what he preaches, last year was signally honored for this conformity when he was awarded a plaque by the Associated General Contractors of America, Inc., for first place in the Group B highway division for accident prevention. He also received a similar safety award that year from the AGC of Iowa.

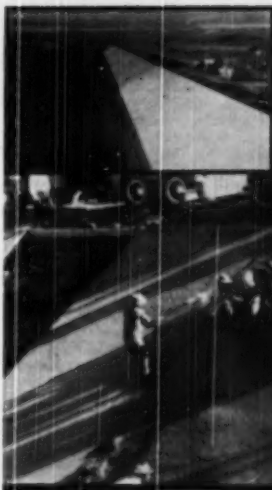
Seeking to expedite the efficiency of his company's operations on distant construction projects and speed up delivery of emergency repair parts, Armstrong flies his own four-place airplane. Last year he logged 350 hours getting spare parts alone.

Floating Bridge Proposed for Hudson River

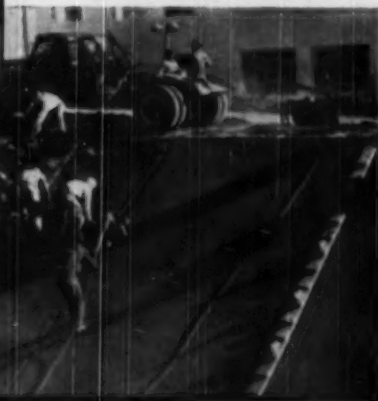
A floating bridge, patterned after the successful and much publicized bridge over Lake Washington in Seattle, is proposed for the Hudson River at Piermont, N. Y. According to an article in the Newark, N. J. *News*, the river at this point widens suddenly and is virtually a lake in its characteristics; hence the feasibility of such a bridge. Tidal range is only 4 ft. Various bridge locations under study by state authorities would require prohibitive expense for long, clean spans and deep foundations. Investigation is being made by the N. Y. Thruway Authority for a floating structure at lower cost.

S. Carolina Raises Gas Tax

One cent increase in South Carolina's gasoline tax rate was voted recently by the legislature. Proceeds of the increase for the first year are to go to general purposes, and for the following three years for farm-to-market roads.



Templeton Gap Spillway, Colorado Springs, Colo. Angle 45°, Concrete slump ¾". Extra men on screed for weight only.



JACKSON ELECTRIC VIBRATORY SCREED

MOST VERSATILE CONCRETE SCREED AVAILABLE

GREATEST PRODUCER
OF QUALITY
WORK ON:

SPILLWAYS

BRIDGE DECKS

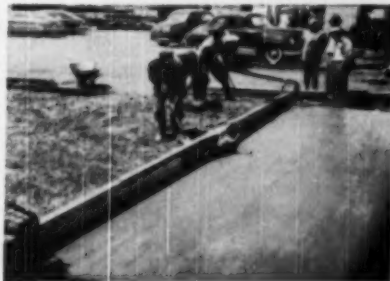
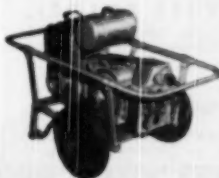
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and WIDENING

AND MANY OTHER
USES

Powered by a thoroughly reliable Jackson 1.25 KVA Portable Power Plant, this manually guided screed will place perfectly upwards of 65 cu. yds. of stiff mix concrete per hour; will undercut at side forms and curbs; strike off to crown (regular or inverted); work right up to and around sewers, manholes and other obstructions. Has strong tendency to propel itself and operators can easily and quickly roll it back for second passes **without bearing the weight of the screed**. Operators work from front, rear or side of machine. Quickly adaptable to any slab width from 6' up to any practical width. You're missing a tremendous time-and-money-saver if you are not familiar with the Jackson Screed. Write for details or see it at your Jackson distributor.

Model M-1 Power Plant — operates the screed. Generates both single and 3-phase 60 cycle, 115 volt A.C. Equipped with generator requiring no maintenance or adjustment. May also be used for lights or operating tools. Other plants of 2.5 and 5 KVA capacities.



OTHER MONEY-MAKING VIBRATORY EQUIPMENT for all types of concrete construction from thin sections to mass construction, highway and airport paving. **FOR SALE OR RENT** at your Jackson Distributor. Write for handy Jackson "Pocket Guide" to the complete line.

ELECTRIC TAMPER & EQUIPMENT CO. Ludington, Mich.

Subgrade Soil Exploration for Highways

(Continued from page 58)

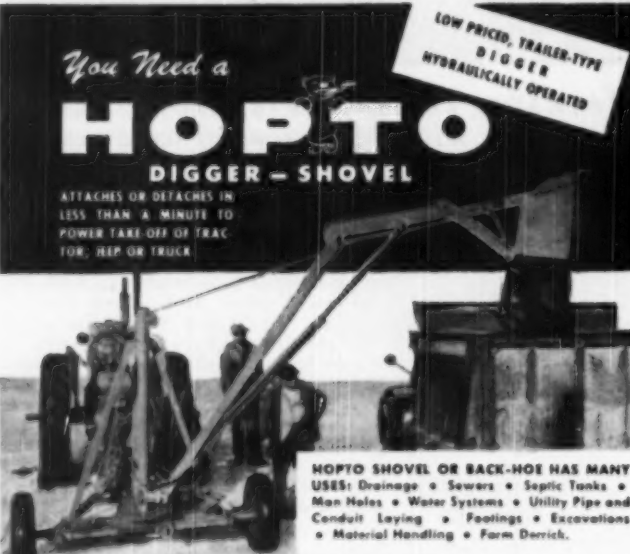
50. Johnson, A. Morgan, "Aerophoto Interpretation and Engineering Evaluation of Northwest Indiana Sands," Thesis, (Submitted to the Faculty of Purdue University in partial fulfillment of the requirements for the degree of Doctor of Philosophy), August 1949.
51. Hittle, J. E., "The Application of Aerial Strip Photography to Highway and Airport Engineering," Proceedings of the Highway Research Board, Vol. 28, pp. 228-235, December 1948.
52. Front, R. E., "Identification of Granular Deposits by Aerial Photography," Proceedings of the Highway Research Board, Vol. 25, pp. 116-129, January 1946.
53. Farvis, M., "Regional Drainage Patterns of Indiana," Unpublished thesis, Purdue University, 1947.
54. Leighton, Morris M., "The Road Building Sands and Gravels of Washington," Washington Geological Survey, Olympia, Bulletin No. 22, 1919.
55. "Soils of the United States," Part III, Atlas of American Agriculture, U.S.D.A., Washington, 1935.
56. "Soils and Men," Yearbook of Agriculture, U.S.D.A., Washington, 1935.
57. Woods, K. B., "The Correlation between Pavement Performance and Soil Textures," Proceedings, Tennessee Road School, April 1947.
58. Junda, H. F., "Longitudinal Cracking of Concrete Pavements on State Highway 13 in Clark and Taylor Counties, Wisconsin," Proceedings, Highway Research Board, Vol. 15, pp. 157-169, 1935.
59. Woods, K. B., "Relation of Soil Studies to Highway Engineering," Proceedings, Twenty-fifth Annual Road School, Engineering Bulletin of Purdue University, Extension Series No. 44, Vol. 23, No. 1, January 1939.
60. Woods, K. B., "How Ohio Uses Soil Studies," Annual Conference on Highway Engineering, University of Illinois, Urbana, March 5, 1938. (University Bulletin No. 77, Vol. 35, May 24, 1938.)
61. Waring, Gerald A., "Geology and Water Resources of a Portion of South-Central Washington," U.S.G.S., Washington, Water-Supply Paper 216, 1913.
62. Pardee, J. T. and Bryan, Kirk, "Geology of the Latak Formation in Relation to the Lavae of the Columbia Plateau near Spokane, Washington," Shorter Contributions to General Geology, 1925, U.S.G.S., Washington, Professional Paper 148, pp. 1-17, 1925.
63. Culver, Harold E., "The Geology of Washington, Part I. General Features of Washington Geology," Department of Conservation and Development, Olympia, Bulletin No. 22, 1934.
64. Huntington, M., "Geology in Highway Engineering," Proceedings, American Society of Civil Engineers, May 1944.
65. Shepard, C. H. and Marshall, H. E., "The Relation of Geology to Soil Mapping in Ohio," Proceedings, Purdue Conference on Soil Mechanics and Its Applications, pp. 288-401, July 1946.
66. "State of Washington," Geologic Map, Washington State Div. of Geology, Pullman, 1936.

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ATTACHES OR DETACHES IN
LESS THAN A MINUTE TO
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TOR, REEP OR TRUCK



LOW PRICED, TRAILER-TYPE
DIGGER
HYDRAULICALLY OPERATED

HOPTO SHOVEL OR BACK-HOE HAS MANY USES: Drainage • Sewers • Septic Tanks • Man Holes • Water Systems • Utility Pipe and Conduit Laying • Footings • Excavations • Material Handling • Farm Derrick.

Compare These Money-Making Features

- Digs over 9' deep and still loads into trucks.
- Hydraulic Cylinders are chrome plated to withstand weather.
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- Highly transportable from job to job without any special permit.

Full 180° swing, finger-tip operation, low first cost, minimum maintenance, and 15-30 yard hourly capacity adapts HOPTO to a wide variety of profitable work. And HOPTO needs no counter weights... NO swing clearance! Three types of buckets, 14' to 24' widths, are available for HOPTO:—enclosed, skeleton, and shovel bucket. Reversible teeth are of cast alloyed steel, heat treated for longer life.

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BADGER MACHINE CO.

WINONA, MINNESOTA • DEPT. P

Improving Your Streets the American Way

(Continued from page 51)

supporting vehicles for fire protection, police protection and personal services. It will lengthen the life of our personal cars and protect our property investment.

"Its maintenance is estimated by authoritative sources at \$150 per year per mile, plus a single sealing job at the end of four or five years; this a figure within the realm of practicability for value received. Bonds can be sold on this project without economic distress to the residents and owners of vacant.

"Such a road, with a rough gravel-like surface, will retain the rural character of the subdivision, be a credit to the city's appearance and renew the faith of its residents in the city's willingness to be of service to its people.

"We believe you will agree that the members of this association have not taken their responsibility lightly to improve Highland Park. We have, to the best of our knowledge, exhausted every alternative open to us in solving our problem, ever keeping in mind that we must be reasonable and within the realm of possibility. We have tried to attack the present intolerable road situation with an open mind, determined to help ourselves and believing that if we have a reasonable solution, that a reasonable city government, such as we have, will give us its usual good cooperation.

Thank you,

Yours very truly,"

[A second installment on the experiences of the Highland Park Woodlands Home Owners Association will appear in a forthcoming issue of ROADS AND STREETS.]

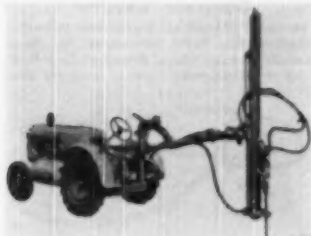
NEW EQUIPMENT AND MATERIALS

New and Improved Construction Products

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.

1 Wagon Drill Utilizes Tractor-Compressor

A new one man operated, self-contained, self-propelled wagon drilling unit, utilizing Le Roi's 105 Tractair tractor-compressor, has been developed by Le Roi Co., Milwaukee, Wis. The Mobildrill consists of a swinging boom which extends out from the Tractair platform and a universally mounted wagon drill guide shell for 6 ft. steel change. The Le Roi Cleveland H10 45



Le Roi Mobildrill.

lb. class sinker operates off the 105 cfm. Tractair compressor. With truck mounted Mobildrills where 160 cfm. compressor capacity is available, a heavier Le Roi Cleveland H23, 80 lb. class sinker may be used.

The Mobildrill is flexible enough to drill angle, vertical or horizontal holes at any elevation and can be equipped with an air motor powered boom. One man can handle every phase of drilling, including the simplified moving of equipment between drilling locations and blasting sites.

2 Lift Gate for Pick-Ups

A new powerful, light weight "freight elevator" known as a "pick-up lift gate," announced by the "Lift Gate" Division of Anthony Co., Stretor, Ill., attaches to the rear of any ½ and ¾ ton pick-up truck. The "Pick-Up" lift gate operated



Anthony Pick-Up Lift Gate

by two powerful hydraulic hoist cylinders makes it possible for the driver alone to lift or lower or stop and hold at any height as much as 800 lb. It makes it possible for him to load or unload heavy awkward or frail commodities at

curb level or ground level. The single lever safety control prevents merchandise damage and stops resulting provoking delays and claims.

3 Moto-Bug Has Fork Lift

A hydraulic lift attachment, added to the Moto-Bug, the power wheel barrow of the Kwik-Mix Co., Port Washington, Wis., has greatly increased the unit's usefulness in special handling problems. The manually operated hydraulic pump lifts a capacity load of 500 lb. Forks tilt to the rear to assure better load balance and are adjustable to a minimum width of 33 in. Other improvements to the Moto-Bug include a large steering wheel and a 5 ft. scraper blade or snow plow attachment. The unit has a conventional 10 cu. ft. hopper body and a 1200 lb. platform body.



Moto-Bug with Fork Lift

4 Wire Line Twist Eliminators

A strengthened and more complete line of Miller swivels for eliminating wire line

4 AT SPRINGFIELD SAND & GRAVEL CO. (ILL.) EAGLE WASHERS

ASSURE PREMIUM MATERIALS!



1 All Material is pumped to "fold" dewatering plant by means of Eagle Water Scalping Tank which removes excess water — concentrated material flows to Eagle Double Screen Unit which deposits washed pit run material on belt for conveying to processing plant.

2 Material passing vibration screen flows to an Eagle Double Screen Fine Material Washer Classifier-Dehydrator producing two grades of clean sand.

3 An Eagle Single Screen Coarse Material Washer — Dewaterer turns out clean gravel, from top deck of screen.

4 An Eagle Single Screen Coarse Material Washer — Dewaterer processes buckshot or torpedo sand from second deck of screen.



What Eagle Screen Units are doing for Springfield Sand & Gravel Co.'s protected and profitable plant, they can do for you. Fine material units are retaining fines even below 100 mesh and reducing moisture content so that residual water offers no difficulty

in bin storage or belt stockpiling. Adjustable long weir can be raised to retain fines, lowered to flow off fines. Eagle builds the broadest line, has the most installations, more years of experience. You can bank on Eagle. Ask for Catalog 47 on Washers — 100 on Water Scalping Tanks.



"SWINTEN" DREDGE LADDERS—SCREW WASHERS
LOG WASHERS—DEHYDRATORS—SAND TANKS
CLASSIFIERS—REVOLVING SCREENS

EAGLE IRON WORKS

179 HOLCOMB AVE., DES MOINES, IOWA

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.

twist and kinking, announced by General Machine & Welding Works, 1100 East 2nd St., Pomona, Calif., consists of 15 different types of end connections and nine swivel capacities ranging from the "AA" Model rated at 250-lb. working load to the "H" Model at 46,200-lb. working load. All Miller swivels have a safety factor of 5 to 1.

5

Plastic Pocket Saver

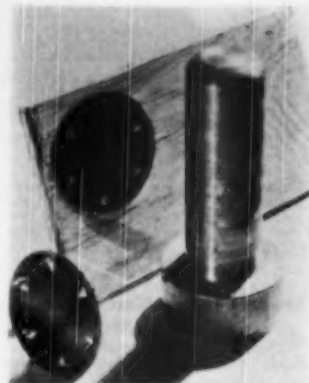
A new plastic pocket saver that saves wear and tear on pockets and is useful for engineers, contractors, office and factory workers, or anyone else who carries pens and pencils in his pockets, has been placed on the market by American Kleer-Vu Plastics, Inc., Brooklyn, N.Y. This product, made of strong, clear, cellulose

acetate plastic, slips easily into any clothing pocket and has a small flap overlapping on the outside, where the material gets clipped. The pocket saver protects the fabric against wear and tear caused when pens, pencils, rulers and other objects are removed and replaced. It also protects the inside of the pocket from being punctured by pencil points, ruler edges or other sharp instruments.

6

Hole Cover for Forms

No more do contractors, who use Plywood for forms, need spend time hunting for the right size cork to cover a hole before re-using their forms. The change has been accomplished by the invention of a simple metal disk, constructed with barbs, called "Ply Hole Cover," manufactured by Troiel Companies, Inc., Berkeley, Calif. These covers are placed over the unneeded hole and, with one blow of a hammer on the magnetic setting tool, they



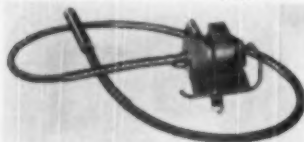
Metal Ply Hole Cover and Magnetic Setting Tool

are driven flush with the surface of the plywood. The covers come in 3 sizes: 1½ in., 2¼ in., and 2½ in. in diameter.

7

Concrete Vibrator

A new lightweight, sturdy and powerful vibrator has been announced by Stow Manufacturing Co., Birmingham, N.Y. This new electric vibrator is equipped with



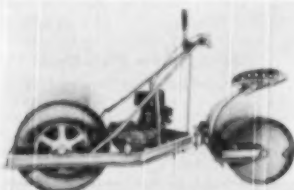
Stow Electric Vibrator

trouble-free Stow flexible shaft, and sealed-in-oil vibrator head. The motor, which delivers up to 9500 rpm is protected by special skid-mounting and has double handles for lifting in either the horizontal or vertical position.

8

Power Roller

A new economical yet sturdy and well built power roller has been announced by Consolidated Industries, West Cheshire, Conn. The weight of the roller empty is



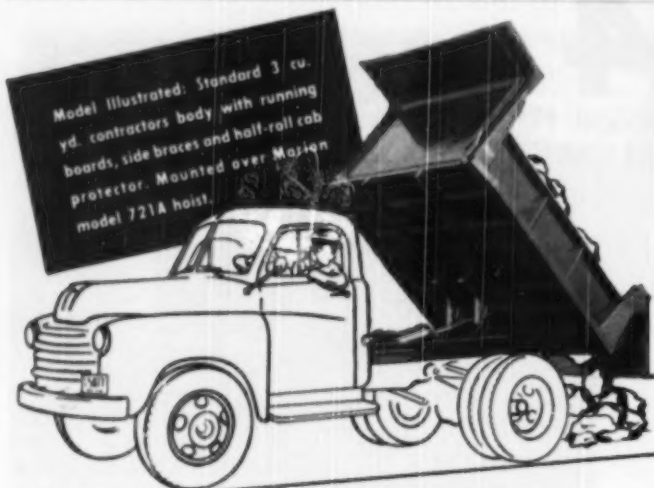
Con-Sol Power Roller

300 lb.; weight with maximum ballast, 1400 lb. The roller is powered by a nationally known gas engine. It has a manually set governor, reverse gear with automatic safety release, and bronze bearings with Alemite fittings. All controls are grouped on handle bar.

9

Asphalt Road Planer

A new asphalt road planer has been added to the line of asphalt surface heaters of Asphalt Maintenance Co., New York, N.Y. The unit is powered by an International Harvester gasoline engine.



Stay Ahead of the Job With "On The Job" Design

It's the day-by-day performance that counts. That's why Marion Bodies and Hoists will help you stay ahead of the job.

Every Marion unit is designed "On The Job" under actual working conditions. Faster loading and dumping . . . extra pounds on every trip . . . longer service life . . . are engineered into every Marion unit.



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Clarkmore Asphalt Road Planer (Model 31)

The heating hood is 6 ft. wide by 21 ft. long. The planing blade is 6 ft. long. One Clarkmore fuel burner supplies heat to the heating hood area. This burner throws a flat or horizontal flame which is deflected by the hood's surface to the asphalt pavement. The even, intense heat makes possible the planing action of the two section planing blades which cut and remove the rough and corrugated pavement surface to any desired depth without tearing or gouging, thus leaving a smooth surface ready for seal coating. The depth of the cut is hydraulically controlled. Approximately 6 gal. of fuel oil is required per hour.

10 25-Ton Cranes

Two new Lorain rubber tire cranes announced by The Thew Shovel Co., Lorain, O., are each rated at 25 tons lifting capacity on outriggers at 20 ft. radius, and capable of working with 130 ft. of boom. Both are new machines developed by modifying the recently announced Lorain-50



New Moto-Crane

series turntable and mounting it on newly designed, heavy-duty rubber tire carriers. The turntable is powered by 6-cylinder gasoline engines. Power is delivered through a Twin Disc hydraulic coupling power take-off and thence by a multiple strand roller chain drive to the operating mechanism.

11 1 Yd. Shovel

The Lorain-50, a new power-shovel crane introduced recently by The Thew Shovel Co., Lorain, O., is rated in the 1 yd. class and is claimed to be the first machine in this class equipped with a hydraulic coupling as standard equipment. The power take-off on the Lorain-50 is by means of a Twin-Disc hydraulic coupling. It is claimed this device prevents stalling the engine due to any digging circumstances and that it provides a means of absorbing digging stresses and strains before they are transferred into the operating mechanism and the cables. The hydraulic coupling is equipped with a plate clutch "de-clutcher" to permit stopping

the machinery without stopping the engine. The standard power plant is a Caterpillar diesel 6-cylinder engine equipped with separate gas starting en-



The Lorain-50

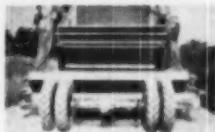
gine equipped, in turn, with an electric starter. A 6-cylinder gasoline Waukesha engine with hydraulic coupling is available as optional equipment.

12 Hardfacing Alloy

A new hardfacing alloy, Aircolite 59, has been added to the line of hard facing alloys of Air Reduction Sales Co., a division of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N.Y. The new alloy, which has been on field trial for more than a year, is designed primarily for applications involving high stress abrasion with medium impact. Cast in rod form, Aircolite 59 is composed principally of chromium, molybdenum, carbon and iron. It has a low coefficient of friction, and therefore, acquires a high polish in service. The deposit maintains its high hardness at temperatures up to 800°F.



Hercules Cement Spreader outperforms all others—at any price!



A TWO MAN TEAM—plus the Hercules—makes up your complete spreading crew; you save from 2c to 3c per square yard in time, labor, and materials!

You'll complete your soil-cement contracts ahead of schedule... cut labor costs... get even spreading without waste with the amazing Hercules Cement Spreader. Just couple it to any conventional dump truck and you're ready to spread any amounts of cement needed up to ten foot widths—all at a single pass. Ruggedly built, easy to operate, mechanically fool-proof, the Hercules Cement Spreader offers you a real profit opportunity in the soil cement field. Send coupon below for complete information.

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Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.

13

Center Dump Trailers

A completely new design of its center dump semi-trailer has been announced by the Omaha Standard Co., Council Bluffs, Ia. Features of this new trailer include low cost, light weight, compliance with bridge and axle laws and a wide range of usefulness. An adjustable latch mechanism, mounted in protected position on the



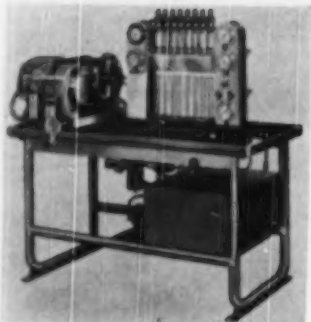
New Center Dump Semi-Trailer

side of the body, allows the operator to pre-set the opening of the dump doors anywhere from 4 to 26 in., to provide an even, metered flow of material while dumping. The latch can be adjusted with the doors open or closed.

14

Calibrating Stand for Fuel Pumps

Fleet owners, repair shops and others who do extensive repairs and adjustments on diesel fuel injection pumps are finding it profitable to have an AP 3200 calibrating stand among their equipment, according to the manufacturer, Automotive Products, Inc., 1700 S.E. Grand Ave.,



AP 3200 Calibrating Stand

Portland, Ore. This new piece of testing equipment is a self-contained unit for calibrating, testing and adjusting fuel pumps. With adapters, nearly every pump made can be accommodated. Pumps and governors can be completely set to exact factory specifications.

15

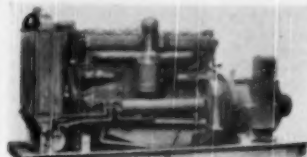
Concrete Drill Bits

A new line of concrete drill bits designed to supplement its "Konkrete Kore" drills has been announced by the Tilden Tool Manufacturing Co., 1995 N. Fair Oaks, Pasadena 3, Calif. The drills are of a new "centerless" design and are furnished in a range of sizes from 3/16 in. to 7/16 in. Because there is no center point to act as a pivot and retard cutting, the new drills are stated to penetrate concrete at high speeds with 80% less pressure than required for ordinary drills of the same diameters.

16

Diesel-Electric Generating Sets

The line of diesel-electric generator sets of Murphy Diesel Co., Milwaukee, Wis., has been expanded to 11 models ranging from 60 to 133 kw. All models comprise heavy-duty Murphy Diesel engines and quality generators engineered as com-



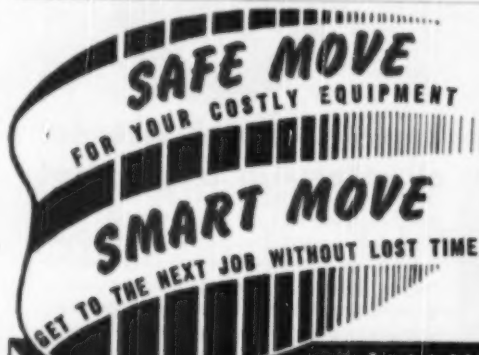
Murphy Diesel-Electric Generator Set

plete integral units and permanently aligned at the factory. Design features of the engines include "true" diesel operation, unit fuel injection, four valves per cylinder, extra heavy crankshaft with extra large bearings and oil cooled pistons.

17

Hoe Front Attachment

The Hyster D6 Hystaway, tractor-mounted 1/2 yd. excavator, may now be equipped with the hoe front which was previously available only for D7 and D8 Hystaways, according to a recent announcement from Hyster Co., Portland, Ore. Other variations already manufactured for the D6 Hystaway include interchangeable crane, dragline and clamshell fronts, all of which are designed for easy mounting right on the job. The hoe front



with JAHN Heavy Duty TRAILERS



WHETHER your load weighs five tons or a hundred, you can depend on Jahn Trailers for safe and economical transportation to the next profitable job. They're famous for the rugged construction that means strength and stamina under the toughest conditions. From Jahn Tilt Trailers for your light equipment to big, sturdy tandem or multiple axle units for your heavyweight loads, there's a size and model to suit your needs. Investigate Jahn Trailers first—see your Jahn distributor today.

JAHN TRAILER DIVISION OF PRESSED STEEL CAR COMPANY, INC.

605, 6th Michigan Ave., Chicago 2, Ill.

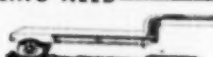
THERE'S A JAHN TRAILER FOR EVERY HAULING NEED



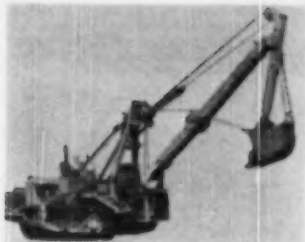
Tandem Axle Trailer



Single Axle Tilt Trailer



Single Axle Trailer



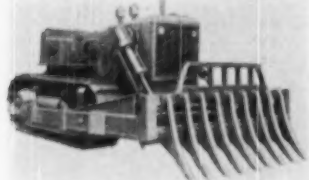
New Hyster D6 Hystaway Hoe Front

can be installed on either new or used Hystaways. Complete tractor mobility and maneuverability are fully retained with the attachment in place. Utility use of a dozer blade on the front of the tractor is still possible, and it takes less than one hour to dismount the Hystaway unit to permit full production bulldozer use.

18

Land Clearing Tool

The root ripper, a new companion tool to the Baker line of bulldozers and grade builders, announced by the Baker Manufacturing Co., Springfield, Ill., is designed for general land clearing operations. It may be purchased as an interchangeable



Baker Root Ripper

attachment for cable and hydraulic bulldozers and graders, or as a complete machine. The attachment consists of 9 teeth, securely bolted to horizontal cross members, which are rigidly tied together by brackets for quick attachment to the bulldozer or grader frame.

19

Desludging Method for Engines

An improved method of removing hard carbon, varnish and sludge from gasoline and diesel engines in one hour's time, developed by the Magnus Chemical Co., Inc., Dept. RS, Garwood, N.J., eliminates the necessity of disassembling the engines. This Magnus 755 desludging method employs the use of Magnus 755 (an emulsion solvent cleaner) and water. 755 contains a soap which combines with the water to form an emulsion which provides excellent lubrication during the desludging process. "Seizing" of engine parts is eliminated by the 755-water emulsion. Also the emulsion provides additional solvent properties.

20

Schramm Pneumajack

A new attachment for its self propelled tractor-compressor combination has been announced by Schramm Inc., West Chester, Pa. The Schramm Pneumajack consists of a pneumatic cylinder mounted on a vertical column at the rear of the Pneumatractor, with a D-55 or D-45 Schramm rock drill mounted on piston rod of pneumatic cylinder. Drill has 36 in. movement making 24 in. drill changes easy. Can also be furnished with two BT-32 backfill tampers or a B-80 paving breaker, mounted on air feed and lift. The tools

only a 1-Man JOB WITH A SAUERMAN EXCAVATOR

Nothing else moves earth quite like a Sauerman Scraper or a Sauerman Cableway Excavator. It saves you dollars and headaches on long range material handling jobs with its simple operation—small maintenance charges—flexibility—sturdiness and dependability.

Tough ground conditions don't stop a Sauerman Machine. It will dig and haul anywhere—on a hillside, in muck, deep under water. Controlled by one easily trained man. Gasoline, electric or Diesel power. There's a wide range of sizes and models to meet every requirement.

Illustrations of typical uses, complete specifications, engineering data, are given in the Sauerman Catalog. Write for it now.

SAUERMAN BROS., INC.

508 S. Clinton St. Chicago 7, Illinois



Sauerman Cableway Excavator pictured above digs gravel from deposit deep under water and delivers to screens on top of site bins. One man's labor and a moderate expenditure of power moves 140 cu. yd. an hour.



Here is a small Sauerman Power Drag Scraper delivering gravel to a hopper that feeds to a crusher. Controlled by one man who sits alongside the centrally located scraper hoist, the bottomless Crescent scraper bucket swings in a wide arc to dig a large, deep pit.

The Ninth of a Series in the interest of more efficient use of steel... a vital American resource



NOW... Available by Number in Standard Sizes of New A.S.T.M. Serial Designation A305-49 Table 1

Thanks to A. S. T. M. specification A305-49, designers now have a more efficient bar for concrete reinforcement... one that provides increased anchorage which when properly used will give appreciable savings in steel and concrete. Advanced design Laclede Multi-Rib Reinforcing Bars exceed the A305-49 specification. They are available in uniform round sections in all standard sizes and can now be ordered by number.

TABLE 1 A.S.T.M. SERIAL DESIGNATION A305-49

Dimensional Requirements for Deformed Steel Bars for Concrete Reinforcement

Bar No.	Unit Wt. Lbs./Ft.	NOMINAL DIMENSIONS ROUND SECTIONS			REQUIREMENTS OF DEFORMATIONS		
		Diameter-Inches Decimal	Cross Sectional Area Sq. inches	Perimeter	Max. Avg. Spacing Inches	Min. Height Inches	Max. Gap, Inches ±
3	0.376	.375	0.11	1.178	0.262	0.015	0.143
4	0.668	.500	0.20	1.571	0.350	0.020	0.191
5	1.043	.625	0.31	1.963	0.437	0.028	0.239
6	1.502	.750	0.44	2.356	0.525	0.038	0.286
7	2.044	.875	0.60	2.749	0.612	0.044	0.334
8	2.670	1.000	0.79	3.142	0.700	0.050	0.383
9*	3.400	1.128	1.00	3.544	0.790	0.056	0.431
10*	4.303	1.270	1.27	3.990	0.889	0.064	0.487
11*	5.313	1.410	1.56	4.430	0.987	0.071	0.540

*These sections have the same weight and area as bars formerly known as 1" Sq., 1 1/8" Sq., and 1 1/4" Sq.

†Chord of 12 1/2% of Nom. Perimeter.

*Bar numbers are based on number of 1/8" included in the nominal diameter of the bar section.

— Write us —



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LACLEDE STEEL COMPANY

St. Louis, Mo.

The ROGERS 4-FEATURE POWER-LIFT DEMOUNTABLE GOOSENECK



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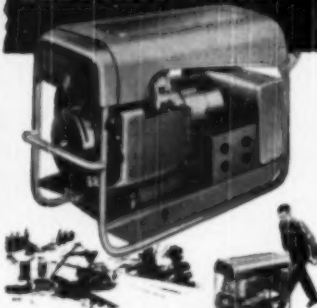
All widths, lengths, and thicknesses accurately punched to fit your make of machine.

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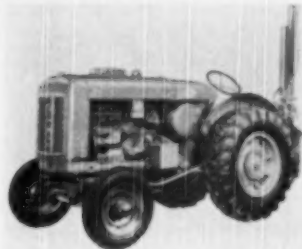


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Carry, wheel, or truck 'em to any spot and plug in for all the electric power you need. Lightweight, Onan air-cooled electric plants supply power for electric drills, saws, planers, spades, tampers, lights... any electrical equipment. Lightweight A.C. models: 400 to 5,000 watts. D.C. 750 to 5,000 watts. (Heavy-duty gasoline or Diesel plants to 75,000 watts.)

Write for Folder
D. W. ONAN & SONS INC.
2822 Registon Ave., Minneapolis 5, Minnesota

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.



Pneumatic Attachment on Pneumatic Tractor
listed all use the same basic air cylinder that feeds and lifts them. Tools can be removed and used as hand held tools. With proper adapter, tools can be used separately on one air cylinder.

21

Steel Clamps for Forms

New adjustable steel clamps for setting up wood forms for curb, curb and gutter and battered curb, made by Pacific Engineering Sales Co., Los Angeles, Calif., are now also adapted to setting up wood form foundations. Comprised of stake and cross piece, this clamp is completely ad-



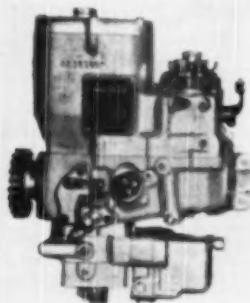
Pacific Bolt Clamp

justable to any curb and gutter cross section in general use throughout the country. Standard steel stakes are used, which prevent kicking out of the forms at the bottom. No special or patented spreaders or wall ties are required.

22

Fuel Pump

A new refinement to the exclusive Cummins fuel system is a new fuel pump, 65% lighter in weight and 56% smaller in size, as announced by Cummins Engine Co., Inc., Columbus, Ind. Known as the DD (double-disc) pump, the new unit is

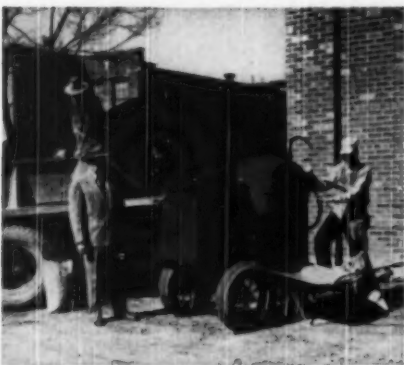


Cummins DD Fuel Pump

BLUE BRUTE USERS AGREE: "It's a Great Line of Mixers!"



FOR CENTRAL MIXING
This modern plant of the Clark Certified Concrete Company, Inc., of Baltimore, Md., produced 125,000 yds. of pre-mixed concrete during the past year. Vice-President Duncan writes: "Your Blue Brute 84-5 Stationary Mixer has proven entirely satisfactory. Maintenance costs have been practically nothing."



FOR PORTABLE MIXING. Le Roy W. Vival, chief engineer of the O'Sullivan Rubber Corporation, Winchester, Va., reports: "We are extremely gratified by our Blue Brute 3 1/2 Tiltting Mixer, which has had two years of constant, severe use. It is extremely mobile, well constructed and performs excellently. Long exposure has not decreased its efficiency. The mixing cycle is fast and the mix consistently uniform. It is a pleasure to endorse and recommend this equipment."

Yes, among Blue Brute owners it's a never-ending story of more concrete at lower cost, trouble-free operation, time and money saved in every detail of mixing operations. Why not look into this proof that *there's more worth in Worthington?* See your nearby Worthington-Blue Brute Distributor, or write for bulletins on mixer types in which you're interested.



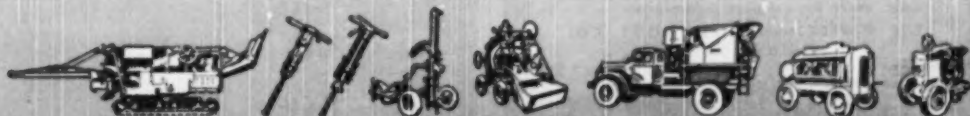
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Worthington Pump and Machinery Corporation
Construction Equipment Department
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WORTHINGTON



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

When writing advertisers please mention **ROADS AND STREETS**, July, 1950

69



FOR TRANSIT MIXING. President Bob McCattle of the Abilene, Texas, Concrete Company, gives his reasons for re-ordering Blue Brute Hi-Up Truck Mixers: "We have compared competitive makes on our jobs and find your Hi-Ups best in every way. Maintenance costs have been negligible. Just purchased your first chain-drive Hi-Up and find it even better than the older machines — faster charging and discharging, easier to maintain and smoother running."



FOR PLACING. In building the Washburn vehicular tunnel under the Houston, Texas, ship channel, the "Trench method" of construction was used. The last yard or two of concrete placed in each of the section joints had to be placed straight upwards — a tricky pouring problem. Merritt-Chapman & Scott Corporation reports an easy solution was found with the aid of a Blue Brute Pneumatic Placer, which performed excellently.

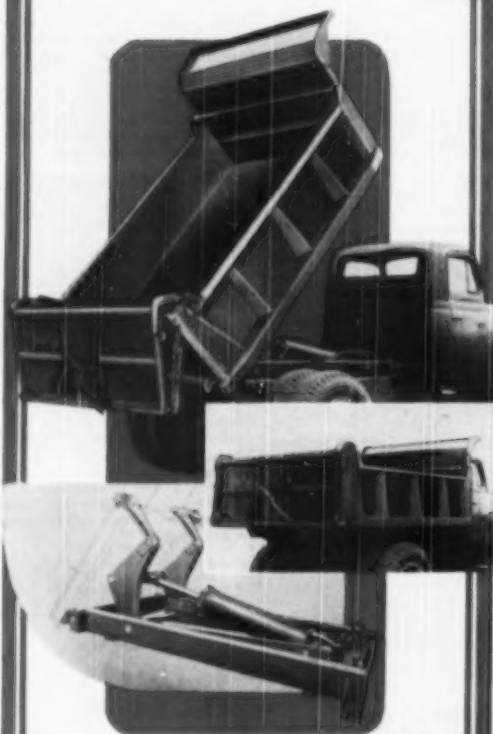
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Photos show a PERFECTION No. 254 (4-yd. capacity) Dump Body with No. 725 Hydraulic Hoist. Write for complete information.

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THE MOST PRACTICAL
AND ECONOMICAL
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designed for longer life operation and for easier servicing. The lighter weight and smaller size facilitates the installation and maintenance of the new pump and further reduces the overall weight of Cummins diesels. Now offered as standard equipment on the 300 Hp model NHRS-600 and 275 Hp model NHS-600 Cummins diesels, the DD pump also is available as optional equipment on other Cummins models.

23

40-Ton Trailer

A new heavy-duty, tandem axle low-bed trailer, developed by La Crosse Trailer Corporation, La Crosse, Wis., has a rated capacity 40 tons, within the 8 ft. width limit. Available with flat or drop type platform, the new trailer is fitted with eight 10:00 x 15 20-ply tires, which are conservatively rated at 50,960 lbs. capacity under the new 20 m.p.h. ratings issued by the Tire & Rim Association. Gross load is distributed 37,440 lb. on king pin and 50,960 lb. on rear axles. Total trailer weight is 11,200 lb. Like other La Crosse tandem axle models, which start at 20 tons capacity, the new 40-ton model is equipped with "walking beams" supporting rear axles.

24

Form Stake

What is claimed to be an entirely new idea in form stakes has been announced by Rockford Bolt and Steel Co., Rockford, Ill. Known as "Saber Stake", it is made of 1½ in. round steel, is 48 in. in length and has a forged steel point. The shipping weight is 13½ lb. each. The 2 in. by 4 in. carrier located near the top has a hole in the handle, so a 2 by 4 can be spiked into a firm, solid position. The stake also can be driven into rocky, hard frozen ground, macadam or black top, thereby making a quick barricade.

25

2-Way Mobile Radio Unit

A completely new F.M. 2-way mobile radio unit now in production by Motorola, Inc., Chicago, Ill., is designed specifically for true adjacent-channel systems. The unit is described as an extremely compact and economical model designated as the



Uni-Channel Sensicon Dispatcher

"Uni-Channel Sensicon Dispatcher." It is available for operation in the 25-50 megacycle or the 152-174 megacycle land mobile service bands. The "Uni-Channel" was designed to provide full adjacent channel operation as well as economic protection in the event of F.C.C. split-channel allocations. The Sensicon Receiver design approach allows easy and inexpensive adaptation to split-channel operation.

26

Versatile Soil Sampling Kit

For obtaining accurate, dependable sub-surface information the Acker Drill Co., Scranton, Pa., has announced a compact and versatile, hand operated soil sampling kit enclosed in a

FRINK

SNO-FLOWS

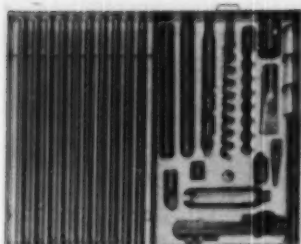
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Soil Sampling Kit

handy steel case which can be carried in any automobile. The twelve soil and earth sampling tools included in this kit can be used to obtain accurate samples to depths up to 25 feet and practically all soil and earth formations. The kit can be used for: testing clay deposits; foundation test borings; sampling gold bearing sands; exploring sand and gravel deposits; subgrade testing prior to highway and airfield runway construction; checking base materials for soil cement stabilization and many other uses.

27

Many Purpose Attachment

A new hydraulically controlled roter, trencher, pipe and cable laying machine for use with a (Allis-Chalmers HD5) front end loader has been announced by A. S. Kinsinger, Route 1, Gordonville, Pa. The machine will fit in the same four pins that hold the shovel, and can be interchanged easily in 15 minutes. As a roter it can be forced into the ground to a depth of 30 in., easily uprooting rock,



Many Purpose Machine

stumps, roots, etc. It also can be used as a subsoiler for draining wet spots in fields and breaking up hard pan and frozen ground. As a pipe laying machine the roter is pulled through the ground, and the pipe attached to the bottom of the specially made and patented shoe. The pipe is then pulled to the desired place. For trenching another shoe will be required. This can be attached by removing one bolt and changing shoes. A trench at least 2 ft or more in depth can be opened.

28

Air-Entraining Agents Dispenser

A new dispenser for air-entraining agents, introduced by Techkote Co., Inglewood, Calif., is claimed to be a revolutionary step ahead in this type of equipment. It operates by passing the liquid agent through a bag which is alternately opened and closed at top and bottom by a tripping mechanism. This release can be actuated either by hand, or by mechanical

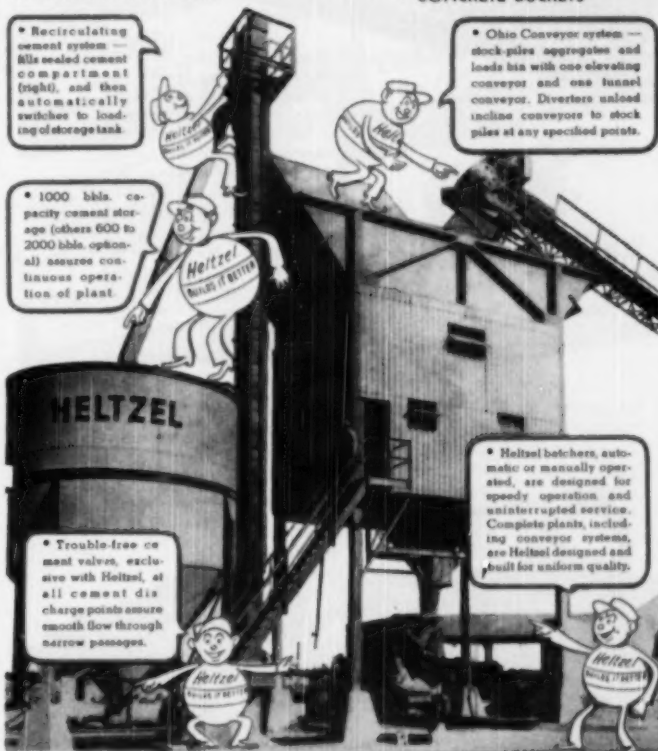


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SUPERIOR *Batching Plants*

• More efficient batching plants will effect savings for you in operation and plant costs. Heltzel's specialized engineers work out your specific problems on both stationary and portable installations, ranging in capacities from 30 to 500 tons. Why not let a Heltzel representative explain exclusive features and Heltzel's better construction.

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• Recirculating cement system — fills sealed cement compartment (right), and then automatically switches to loading of storage tank.

• Ohio Conveyor system — stock-piles aggregate and loads bins with one elevating conveyor and one tunnel conveyor. Diverters unload incline conveyors to stock piles at any specified points.

• 1000 bbls. capacity cement storage (others 600 to 2000 bbls. optional) assures continuous operation of plant.

• Trouble-free cement valves, exclusive with Heltzel, at all cement discharge points assure smooth flow through narrow passages.

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FOR BRAKE AND CLUTCH USE

Velvetouch

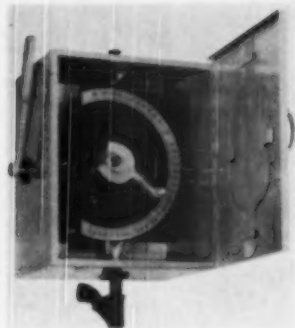


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Tachlote Mech Automatic Dispenser

means in connection with the water discharge to the concrete mix. The quantity discharged can be easily dialed in units of ounces.

29 Lift-Loader Attachment for Maintainer

A new lift-loader attachment for its Maintainer, announced by Huber Manufacturing Co., Marion, O., is hydraulically-operated and can raise a 1000 lb. load 9 ft. 8 in., dumping at any desired height. The loader is the double cylinder

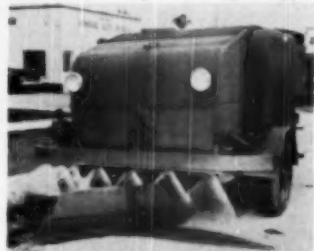


Huber Maintainer Equipped with
Lift-Loader

type and carries the standard $\frac{3}{4}$ cu. yd. bucket. It can be equipped with a snow bucket or a sod fork. Because the loader mounts on the Maintainer frame at the blade lift cylinder uprights, it is possible to bring the lip of the bucket, in loading position, to 34 $\frac{1}{4}$ in. ahead of the front wheels. Spillage of the load is held to a minimum by the quick tilting action of the bucket as the load is raised.

30 Sweeper Has 3 Cu. Yd. Hopper

A new model motor street sweeper added to the line of Wayne Manufacturing Co., Pomona, Calif., has a hopper capacity in excess of 3 cu. yd. It actually self-loads 84 cu. ft. of dirt and debris. The hopper, actuated by a hydraulic ram controlled by the operator, opens like a clam shell bucket. Despite its larger hopper,



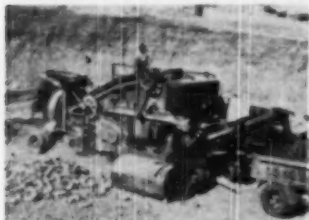
New Wayne Sweeper in Action

the over-all dimensions of the new sweeper are slightly less than the Wayne 2-yd. model. This has been accomplished by lowering the frame and redesigning the dumping mechanism. An exclusive Wayne feature, retained in the new feature, is the forward gutter broom which sweeps along the curb ahead of the front wheels, protecting the tires against damage and enabling the driver to watch traffic while he sweeps.

31

Crushing and Screening Plant

The Universal Engineering Corporation, Cedar Rapids, Iowa, has announced the addition of new features in the Model 880 Junior "B" Gravelmaster crushing, screening and loading plant. The over-all height



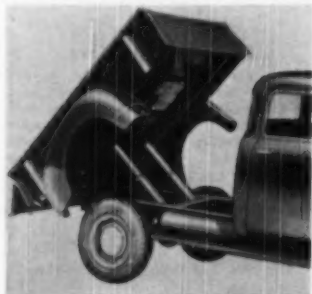
Junior "B" Gravelmaster

has been lowered and the screening area increased with a 2 ft. x 8 ft. 2 1/4-deck screen. The Junior "B" also has provisions for the removal of chips. A 10 in. x 16 in. roller bearing jaw crusher and an 18 in. x 16 in. star gear roll crusher is used in the Junior "B," and power is mounted on the plant.

32

Pick-Up Dump Conversion

A new pick-up dump conversion, introduced by Hercules Steel Products Corporation, Gallon, O., converts 1/2 ton, 3/4 ton, and 1-ton pick-ups into efficient dump trucks. The main elements of the new accessory are: Hydra-clutch Pump, a clutch-type hydraulic pump, fan-belt powered, operated only when dumping; steel



Engine Driven Low-Mount "Tipster"

understructure for mounting under the pick-up body; and twin cylinder hydraulic hoist rams. The principal feature of the accessory is that rapid unloading can be handled from the cab of the truck since the hydra-clutch is operated by a single finger-tip dashboard control.

33

Surveying Instrument

A new surveying instrument, Wasatch Layout Pentaprism, announced by Stratton Instrument Co., Los Angeles, Calif., is stated to be unique in engineering optics in that forsite images are erect and positive. The instrument is claimed to be particularly useful for ground and drill hole

Order your low-cost Bantam NOW!



CRANE.....\$4865*
Lifts up to 10,000 lbs.

MOUNTS ON NEW OR USED TRUCK



DRAGLINE.....\$5260*
Digs up to 70 yds. per hr.

GOES IN WHERE BIG RIGS STOP



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Digs 100' of 5' trench per hr.

RUNS ANYWHERE, ANYTIME



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Digs up to 80 yds. per hr.

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WHY TIE UP BIG EQUIPMENT, when so many of your jobs can be done faster, easier, at less cost with a low-priced Bantam? You'll find Bantam ideal for spotting steel, lifting pipe . . . loading and stockpiling materials . . . digging basements, sewer and water lines, etc. Gives you BIG SAVINGS on production jobs . . . BIG EARNINGS on scattered jobs. In fact, there's still time for a Bantam to pay for itself on your operations yet this year. So don't delay — get your Bantam order in TODAY!

BB-C-4

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The THRIFTY machine with the BIG earning range

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The bright clear light of a DIETZ HIGHWAY TORCH actually waves the warning: "DANGER-BEWARE."

DIETZ HIGHWAY TORCHES are nationally accepted as the standard, due to their ability to stand up. They are leak proof, rain proof, and wind proof. No. 87 with weighted bottom (illustrated) will burn about 30 hours without refilling and is popularly priced.

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**JEEP IT ANYWHERE
FOR TEST DRILLING**
Core drill can be mounted
on truck or jeep

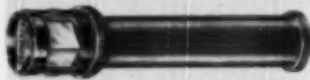
The new Acker Terezo is so light, so compact, so simple that it can be mounted easily on truck or jeep and driven by separate motor or power take-off. Small as it is, the Terezo is a high capacity, fast-operating unit capable of extracting cores up to 2-3/16" in diameter and of drilling to depths of 600 feet.

Send for bulletin 3-A-RS.

ACKER DRILL COMPANY INC.

Scranton 3, Penn.

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.



Wasatch Layout Pentaprism

layouts, earthwork mensuration, field inspections, slope surveys, irrigation and agricultural problems, highway and flood control routines, foundation layouts, and like applications involving angles of 90 degrees and multiples thereof. The instrument is carried in a "lighthouse" mount, protected by a revolving shutter. Backsight alignment is accomplished by two pairs of "see" sights, opposed at 90 degrees to each other.

34

Motor Grader

A new motor grader added to the line of the American Road Equipment Co., Omaha, Neb., has a 12 ft. blade designed for greater angularity and pitch to make it possible to cut 3 ft. ditches with proper



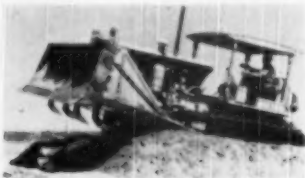
Model 900 American Motor Grader

"slicing" action. The new model weighs 10,000 lbs. and is powered by a 50 hp. Minneapolis-Moline gasoline engine. It has a 16 ft. 4 in. wheel base and a larger hydraulically controlled circle. The grader is completely hydraulic. Every operation can be instantly and accurately controlled by self-centering control liners in the cab.

35

Back Rip Scarifiers

Back rip scarifiers, mounted on the back-side of bulldozer moldboards, now being introduced by Preco, Incorporated, Los Angeles, Calif., are claimed to make forward blading easier and faster. The



Preco Back Rip Scarifier

scarifier rips the ground when the tractor backs up and floats on top of the ground when moving forward. The teeth rip and loosen packed soil, black top and hard ground. A set of back rip scarifiers consists of four curved shanks capped lock-on replaceable teeth, each mounted in a separate housing which is welded to the back of the bulldozer moldboard.

36

Portable Air Compressors

Two new Blue Brute portable air compressors introduced by Worthington Pump

and Machinery Corporation, Construction Equipment Division, Holyoke, Mass. though basically engineered for a low cost and small capacity, contains the same mechanical features of larger Worthington portables. Hand truck air trailer models are available. These 2-stage, air cooled



Trailer Model Portable Air Compressor

compressors with 30 cu. ft. capacity at 100 lb. pressure, have a maximum operating pressure of 150 lb. Powered by a hand-cranked, air-cooled gasoline engine, the compressors have Worthington's patented feather valve, suction valve unloading, and a general design readily accessible for easy maintenance. They are equipped with air maze oil bath cleaners and standard ASME air receivers (Massachusetts standard at slightly extra cost). A protective all steel canopy is also available.

MANUFACTURERS' LITERATURE

37

Concrete Mixers

A new bulletin on Worthington-Ransome Blue Brute Concrete mixers, Models 11-S and 16-S has been issued by Worthington Pump and Machinery Corporation, Harrison, N. J. The 11-S two-wheel and four-wheel and the 16-S four-wheel mixers are illustrated and described as well as the principle features of the mixer. Job illustrations are shown, and specifications of the mixers are included.

38

Heater Planer

Six ways of improving and maintaining old bituminous pavements by the use of the heater planer are described in a 16-page booklet issued by Universal Road Planer Corporation, Columbus, O. Two pages are devoted to an illustration of the heater planer and a description of how it works. Sections are included on surface treatment, widening and resurfacing and dissipation of gutter depths.

39

Plastic Adhesive Coat

A new 4-page product data sheet available from the Industrial Products Division, The Flintkote Company, New York, describes a spray-applied plastic adhesive seal coat and colored mineral granule application for weatherproofing and restoring unsightly and leaky masonry walls. This coating system for exterior use, known as "Binderseal and Granules" consists of a spray coat of the specially compounded asphaltic material, followed by application of decorative granules which are embedded in the seal coat.

40

Rubber for Paving Surfaces

A new and informative 8-page booklet on the use of rubber in paving surfaces has been issued by the Rub-R-Road Division, The Firestone Tire & Rubber Co.,

Akron, O. The booklet sketches the extensive background of Firestone in rubber paving. Illustrations and brief descriptions are given of how rubber is used in paving operations. Pictures also are included on some current Rub-R-Road projects.

41

Concrete Construction

A 12-page illustrated booklet issued by Sika Chemical Corporation, 36-49 Gregory Ave., Passaic, N. J. gives detailed information and specifications on Sika compounds engineered to answer specific problems of concrete and masonry construction. Describes the use of Plastiment retarding densifier to render structures resistant to water, cracking and absorption, and to keep water content, concrete quality and

42

Hoist, Power Take-Offs

Three bulletins have been issued by Hercules Steel Products Corporation, Gallion, O., describing its products. Form 3459 includes descriptive material on all Hercules hoists, medium duty, heavy duty and special bodies, and special accessories. Form 6050 illustrates and describes the exclusive Hercules tire and tool pack utility compartment and the Hercules KT and KDT hoists for use with type body. Form 1049 describes the



Front End Loader



Power Sweeper



Crane Hook



Bulldozer



Backfiller



Snow Plow



MODEL 501

Bigger and Better Power Grader

Powered by 50 h.p. Minneapolis-Moline Engine, the new M-B Model 501 will do every type of grading job including 2 to 1 bank sloping, at low cost. Big 18.00 x 26 pneumatic tires. Blade $\frac{3}{8}$ x 18" x 12' exerting maximum pressure of 8220 lbs. Hydraulic blade shift. Ross Worm Gear steering. Overall length 21 $\frac{1}{4}$ ft. Wheel base 17 ft. 4 in. Weight, without cab and scarfier, 16,000 lbs. Available with any or all of the M-B attachments illustrated here.

Investigate the M-B Line of Power Graders and Maintainers . . . Front End Loaders . . . Power Sweepers . . . Industrial Street and Highway Markers . . . Tilt-Bed Trailers . . . Winches . . . Conveyors. Write for literature.

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The M-B insignia is your assurance of high quality.



Backed by a quarter century of specialized experience.

POWER GRADERS

Additional facts on products described below can be obtained from the manufacturer via postcard inserted at page 100. Each item is numbered. Just circle the corresponding number on the card and mail.

four Hercules models of split-shaft power-take-offs and gives complete data on construction features and applications.

43

20-Ton Crawler Tractor

A new 24 page catalog featuring the 20-ton HD Crawler tractor with torque converter drive has been released by the Tractor Division of Allis-Chalmers, Milwaukee, Wis. Complete details of the tractor are given. The catalog contains a precise discussion of the torque converter

drive. One page is devoted to operators and servicemen who will work with the tractor. Cutaway views and specifications on GM's two-cycle diesel engine provide a general description of the HD's power plant. A full list of tractor specifications is included.

44

Rotary Sand Dryer

Many improvements in its A-8 rotary sand dryer are described in a flyer issued by Joy Manufacturing Co., Mines Equipment Division, Pittsburgh, Pa. The drying capacity of the unit is stated to be 2 to 3 tons of sand per hour at an average fuel consumption of 4.4 gal. of #5 Baume or Diesel fuel oil with low or high pressure oil burners. It is also available with gas burners.

45

Electrical Connectors

A new 8-page bulletin available from Dept. 28, Mines Equipment Division, Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh, Pa. illustrates and describes their standard line of molded neoprene rubber electrical connectors and associated equipment such as lamp sockets, distribution centers and vulcanizers.

46

Concrete Cutter

The use of segmented diamond abrasive wheels in speeding concrete removal is the subject of an 8-page bulletin published by Felker Manufacturing Co., Torrance, Calif. Illustrations and descriptions of the use of Felker concrete cutting machines on various jobs are given. Cost figures on several jobs are included.

47

Holder Stand for Lanterns

New holder stands for lanterns, high-way torches and warning flags are illustrated and described in a circular issued by Pucel Enterprises, Inc., Cleveland, O. The stands are of welded steel construction, finished in bright safety yellow. Advantages claimed for the stands include: Secured footing for lanterns, torches and flags on all kinds of surfaces; Increased visibility by increased height of warning device above ground surface; Reduction of lantern and torch thefts; Full 24 hour a day service at low cost—holding flags by day, lanterns and torches by night.



FOR OVER A QUARTER CENTURY

The WAUSAU IRON WORKS has concentrated its full efforts and engineering skill toward one objective -- BUILDING THE BEST SNOW PLOWS AND SNOW WINGS IN THE WORLD.

Today, as in the days when WAUSAU and its dealers helped far-seeing Public Officials pioneer the idea of snow removal, the name WAUSAU on a snow plow is the symbol of quality backed by these proven features of superiority in construction and design:

● MOLDBOARDS

- Alloy steel for strength.
- Rolled smooth for less resistance.
- Adjustable for pitch.
- Spring mounted deflectors.
- Adjustable and oscillating shoes.
- Level Lift.

● HITCH

- Tailored to truck to distribute weight and stress.
- 4 or 6 point push using Wausau's exclusive toggle.
- Chafing for side thrust.
- Vee and One-way interchangeable.

A size and shape for every need on every type of motive power from light weight speed plows to the Largest Heavy Duty plows which use plate deck plus riveted and welded construction with truck frame chafing.

Sold and Serviced By Leading Equipment Distributors

WAUSAU IRON WORKS

— Pioneer Snow Plow Builders —

WAUSAU, WISCONSIN



New Sales Manager for Baer Steel. Manford R. Lillengreen has been appointed sales manager of Baer Steel Products, Inc., Auburn and Renton, Wash.



M. R. Lillengreen

He will maintain close personal contact with contractors in all parts of the U.S. In addition, he will franchise new dealers to better serve the firm's national market. Products offered include a complete foundry line of contractor's equipment including "Fibraloy" dragline, shovel, and hoe buckets and accessories for all makes of excavating buckets.

New Huber Eastern Sales Manager. D. M. Brendle, heretofore Huber distributor in south-central Pennsylvania, has been appointed eastern district sales manager for Huber Manufacturing Co., Marion, O., with headquarters in Ephrata, Pa. He will work with distributors of Huber road equipment throughout all the New England states, New York, Pennsylvania, Maryland, Delaware, New Jersey and Virginia.

Pressed Steel Buys Jahn Co. Pressed Steel Car Co., Inc., Chicago, Ill., has purchased the C. R. Jahn Co., Savanna, Ill., a

leading maker of heavy-duty trailers. The manufacturing operations will be moved to Pressed Steel Car's Mount Vernon, Ill., plant while the sales and executive offices will be located at 6 N. Michigan Ave., Chicago. This change will greatly increase the research development and productive facilities for trailer manufacture. The name of the Jahn organization, which was established in 1932, has been changed to Jahn Trailer Division, Pressed Steel Car Co., Inc. C. R. Jahn, president of the C. R. Jahn Co., will be manager of sales of the new company and his son Herbert Jahn will remain in charge of trailer design.

LeTourneau Ads Win First Place Award. Advertising campaigns of R. G. LeTourneau, Inc., Foris, Ill., whose advertisements appear in this publication, won a first place award in the 1950 competition for advertising in industrial publications sponsored by Associated Business Publications. A series of advertisements in LeTourneau's Export advertising cam-



First Place Silver Plaque Award to LeTourneau—Joe Serkovich (center), Advertising Manager for LeTourneau, accepts first place silver plaque award from James G. Lyne (right), chairman of Associated Business Publications as Arnold Andrews, head of LeTourneau's advertising agency, looks on.

aign took top honors, winning the first place silver plaque award; and the company won a Certificate of Merit for its industrial advertising in another division of the contest. LeTourneau's winning campaigns were among the 24 chosen from 495 entries which, in the opinion of the contest judges, made the most effective use of their space in industrial publications. This is the sixth year in succession that LeTourneau has won awards in the eight years they have been offered.

On hand to receive the awards at the presentation made at St. Louis, May 2, were Joe H. Serkovich of Foris, LeTourneau's advertising manager, and Arnold Andrews of Milwaukee, Wis., head of the company's advertising agency.

New Bucyrus-Erie Distributor. Contractors Machinery Co., San Antonio, Tex., has been appointed distributor in south central Texas for Bucyrus-Erie Co., South Milwaukee, Wis. Their territory is bounded by and includes these counties: on the east—Aransas, San Patricio, Bee, Karnes, Gonzales, Caldwell, Travis and Burnet; on the north—Llano, Mason Menard, Schleicher and Crockett; and on the west—Val Verde.

Howerton Joins Hyster. Raymond L. Howerton is now in charge of tractor equipment promotion for the Hyster Co., Portland, Ore. For 1½ years he was Northwest representative for Hartwell Engineering and for two years he was salesman of oil field, general contracting and industrial equipment for the Great Northern Tool and Supply Co. Most recently he was associated for two years with the Lincoln Electric Co., as dealer manager in the Pacific Northwest.

Winter Frosts... Spring Thaws... Months of Use and Abuse... **PROVE ATHEY LOW-COST ROAD REBUILDING METHODS**

Will County, Illinois, urgently needed a new surface on a section of old highway, surfaced with bank-run gravel and an oil mix.

Johnston Road Builders, Inc., went to work on the project. Their motor grader scarified the surface 6" deep, producing material made up of 6" and 8" rocks and gravel, that had to be reduced. *An Athey Force-Feed Loader-Portable Breaker Plant was assigned the job.* The team picked up the material... crushed it to 1½" minus grade... returned it to the roadbed in even windrows — 100 to 125 tons per hour!

Oil mixed, rolled and compacted, the material made a new, smooth surface that withstood seven months of the hardest travel and weather! *This, plus the savings in material, time and money could not be equalled with any other method!*

These savings can be yours — with an Athey road-rebuilding team on your job. See your Athey-"Caterpillar" Dealer for more details — today!



The modern Athey method of road-rebuilding gave Will County unequalled savings, as well as a strong, smooth-surfaced road. Look at the big rocks that were picked up, crushed and made into the good road at top... still smooth after 7 months of the hardest use!

Athey Products Corporation, 5831 West 45th Street, Chicago 24, Illinois

Athey

Road Rebuilding Equipment Force-Feed Loader and Portable Breaker

S. E. Wellman Opens Export Office. The S. E. Wellman Co., Cleveland, O., manufacturer of all-metal clutch plates, clutch facings and brake linings for trucks, earth moving and industrial equipment, has opened a new export office



J. E. Crosby (left), J. A. Roesch

at 8 South Michigan Ave., Chicago, Ill. The office is adequately staffed to service all foreign markets, and is under the direction of John E. Crosby and J. Albert Roesch, who have had many years of experience in export fields.

Butcher Joins Worthington. Charles A. Butcher has been appointed assistant to the president of Worthington Pump and Machinery Corporation, Harrison, N.J. Mr. Butcher formerly was general manager of Crocker-Wheeler Electric Manufacturing Co., and vice president of its successive parent companies, Joshua Hendy Corp. and Elliott Co. He will make his headquarters at 2 Park Ave., New York, N.Y.

New Federal Sales Representative. W. H. Hubbell has been appointed factory

sales representative for Federal Motor Truck Co., Detroit, Mich., in the Richmond region. Bringing an extensive background in sales work to his new post, Hubbell will direct dealer merchandising programs and sales and advertising activities for the company in Virginia and the District of Columbia.

Expands Indiana Equipment's Territory. Fourteen counties in Ohio were recently added to the territory in which Indiana Equipment Co., Inc., Indianapolis and Ft. Wayne, sells and services Bucyrus-Erie general purpose excavators. The counties—all in northwestern Ohio—are: Williams, Fulton, Lucas, Defiance, Henry, Wood, Paulding, Putnam, Hancock, Van Wert, Allen, Hardin, Mercer and Auglaize.

New Marion Distributors. Rasmussen Equipment and Supply Co., 1960 South Second West, Salt Lake City, Utah, has been appointed distributor for Marion Power Shovel Co., Marion, O., for the state of Utah, eastern Nevada, three counties in Southern Idaho and two counties in southwestern Wyoming. Sioux Machinery and Supply Co., 315 West 7th, Sioux City, Ia., has been appointed distributor of Marion excavating equipment in Western Iowa and Eastern Nebraska. Ruffridge-Johnson Equipment Co., 250 Tenth Ave. South, Minneapolis, Minn., has been appointed distributor for the entire state of Minnesota. The mining companies on the iron range are excluded from this contract.

Fleming Opens New Division. A new division of Fleming Manufacturing Co., St. Louis 9, Mo., maker of complete concrete block plant equipment, has been opened. It will be known as the Bin and

Batcher Division and will specialize in all types of material handling equipment used in the concrete products and ready mixed concrete industries. This equipment will feature a variety of types of bins and batching plants, bulk cement plants, bucket elevators, belt conveyors, etc., and much of the equipment can be utilized in the general construction field. John F. Van Way, formerly with the C. S. Johnson Co. and the Erie Steel Construction Co., has been placed in charge of this new division.

New Trackson Works Manager. George M. Graetz has been appointed works manager for Trackson Co., Milwaukee, Wis. He will be responsible for the manufacturing activities at both Milwaukee plants. Mr. Graetz was recently works manager for Line Material Co. of South Milwaukee and previously had been works industrial engineer at the Duluth, Minn. plant of the American Steel & Wire Co.

New Officers for Broderick & Bascom. The Broderick & Bascom Rope Co., St. Louis, Mo., has acquired the entire stock interest of the Broderick family, and John K. Broderick and Arthur L. Broderick have retired as president and vice president, respectively, and as directors. Charles E. Bascom has been elected president of the company and Joseph H. Bascom has been elected first vice president and secretary-treasurer. These officers and J. F. Hedding of Pittsburgh constitute the new Board of Directors. The Bascoms will continue in active management of the rope company which will celebrate its 75th anniversary next year. The business was started by Joseph D. Bascom and John J. Broderick as a partnership in 1876 and was incorporated in 1882.

You Can't Beat Welded Construction

WELLMAN

Williams Type BUCKETS

• Wellman pioneered welded rolled steel construction for longer life and greater service. It's the extra strength that gives the extra, low-cost digging power. Whatever your requirements... whether for Multiple Rope, Power Arm, Dragline, Power Wheel or Special Service—specify Wellman! ¾ to 16½ yd. capacity.

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THE WELLMAN ENGINEERING COMPANY
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Bituminous ROADS AND STREETS

Missouri Armors Shoulders Along Industrial Highway

SHOULDERS take a beating along with the pavement when a state highway enters a metropolitan area. The shoulder wear and tear is particularly heavy if the highway consists of dual 18-ft. pavements and traverses a wholesale and factory district.

Such is the case with Missouri U. S. 69 entering North Kansas City from the north. The accompanying photos, taken in May this year, shows the first step in a stabilizing procedure for the shoulders of this busy highway.

This job was done by the state highway maintenance force in Clay county, the purpose, according to state highway division engineer H. M. Brush, being to eliminate the rut along the inner shoulders of the dual roadway. The concrete pavement at this location consists of two 18-ft. lanes with a 30-ft. center parkway.

Due to the large amount of commercial development along the highway, it was found expedient to erect a guard rail around the parkway. The inner shoulders on both sides of each lane were covered with crushed stone a number of years ago, and the outer

shoulders were surface treated. The inner shoulders have been maintained by blading. However, this had become quite a problem following erection of the guard rail, so it was decided that more stable material should be placed along the slab edge.

Since there was already a rut 2 to 3 in. deep and 12 to 18 in. wide along the pavement edge, a logical thing to do was to fill the rut with premixed bituminous material. The shoulder was primed (as pictured) to a width of 2 ft. with an MC oil equivalent to about an MC-1 (MC-3 cut with kerosene). Cold mix material, consisting of $\frac{3}{4}$ -in. max. limestone with MC-3, was then placed along the pavement, bladed into place, and rolled with truck wheels.

The premixed material was secured from a highway department cold-mix plant set up in Jackson County near Kansas City to serve the area. It may be interesting to note that the plant was moved to this location last December and, with the exception of bad days, has been operated almost continuously. It has supplied patching material for Platte, Clay, Ray,

Jackson, Lafayette, and Cass counties during the past winter and early spring.

Nine of the 13 township road units in Union County, Southern Illinois, recently voted to pass out of existence and merge with the County. Proponents of the merger urged it as a means of more economical road building and maintenance. The Union County Farm Bureau backed the move along with many rural road commissioners and business leaders.

This move comes during a time when state-wide agitation exists to eliminate or combine township governments in Illinois. A typical county, in addition to supporting its own road organization with its extensive modern equipment, has usually as many as 12 to 16 townships which maintain tertiary roads. The Illinois Agricultural Association has estimated that these small local road units which once could get by with a few horse-drawn carts, now must have a minimum of \$30,000 worth of mechanical equipment per unit to begin to meet its responsibilities. At present Illinois has some 1,700 road districts. The consolidation takes place under a 1949 law which encourages mergers in the 17 counties of the states which have commission governments. A few as 20 voters in a township may petition to have a proposed merger submitted to a referendum.



★ First pass of distribution along U. S. 69 through North Kansas City, where inside shoulders of dual highway were given a bituminous mat this spring. Etnyre 1000-gal. distributor here set to apply primer 12 to 18 in. wide

TONCAN IRON

**CORRUGATED
METAL PIPE**



CARRIES

Heavy Loads

SAFELY

Manufacturers of Toncan Iron Drainage Products

DEAL PIPE & TANK CORPORATION
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ROBINSON METAL & CULVERT CORP.
ROANOKE, VA.

EATON METAL PRODUCTS CORP.
OMAHA, NEB.
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EASTON METAL PIPE CO. OF MONTANA
BILLINGS, MONT.

EMPIRE STATE CULVERT CORP.
GROTON, N. Y.

ILLINOIS CULVERT & TANK CORP.
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WYATT METAL & BULK WORKS
DALLAS, TEX.
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* Toncan Iron Corrugated Metal Pipe is strong—resilient, too. It is able to support heavy loads of machinery and fill without cracking or crumbling. It withstands vibration, settling soil and weather changes.

But that is only one advantage. It is light in weight—easy to handle and install with unskilled labor. Jobs are completed on schedule.

Toncan Iron Corrugated Metal Pipe costs less in the end—because it has the highest rust-resistance of any ferrous material in its price class. It is made from an alloyed iron containing twice the copper found in copper-bearing steels and irons PLUS just the right amount of molybdenum to make the copper do its best work for you.

If you're looking for drainage structures that last a long time, yet cost little per year of service, see your nearest Toncan Iron Manufacturer, or write us.

REPUBLIC STEEL CORPORATION • GENERAL OFFICES: CLEVELAND 1, OHIO

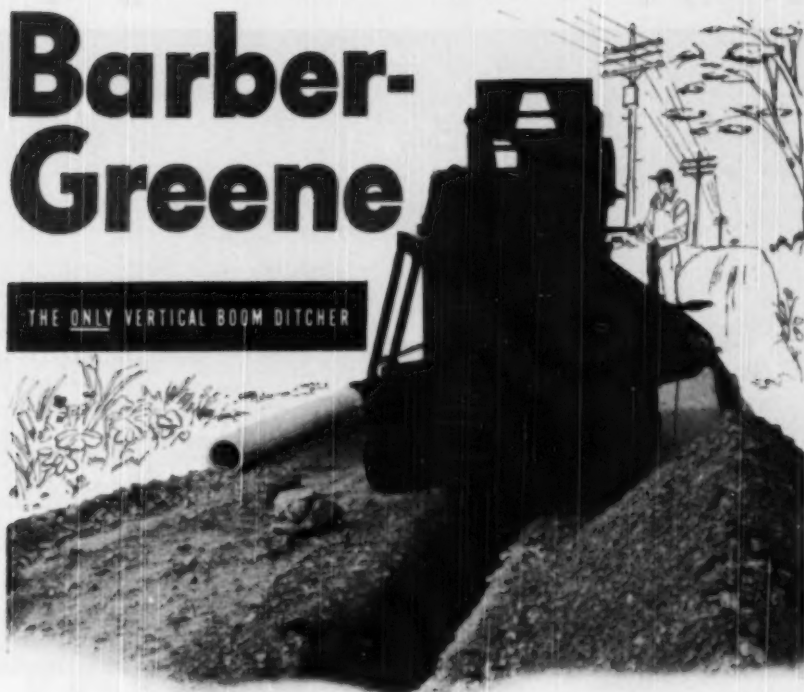


Toncan Copper Molybdenum Iron is available in:

CORRUGATED METAL PIPE • PERFORATED CORRUGATED METAL PIPE • SECTIONAL PLATE PIPE
SECTIONAL PLATE ARCHES • CORRUGATED METAL PIPE-ARCH • SECTIONAL PLATE PIPE-ARCH
CORREL SUBDRAINAGE PIPE • BITUMINOUS COATED AND PAVED PIPE

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digs clean—leaves no ramp • discharges on either side

Here's an exclusive ditcher feature that saves a lot of hand labor. The Barber-Greene's vertical boom digs straight down, right up to walks, foundations, underground piping and mains, etc. There's no ramp to run up digging costs.

Closely spaced, self-cleaning "kick out" buckets, traveling at high rate of speed, cut like a milling machine . . . leave a clean-walled trench. It's this efficient operating principle that gets the B-G Ditcher through materials as tough

as coral rock — down to 8 feet, 3 inches; widths up to 24 inches. Feeding speeds range from 10 inches to 8 feet per minute.

An adjustable spoils conveyor discharges on either side, and the automatic overload release protects both the machine and hidden objects.

Find out how this compact, maneuverable, easily controlled unit can keep your trenching costs down . . . and what varied work it will perform.



BARBER • GREENE COMPANY, AURORA, ILLINOIS

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LOADERS



PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS

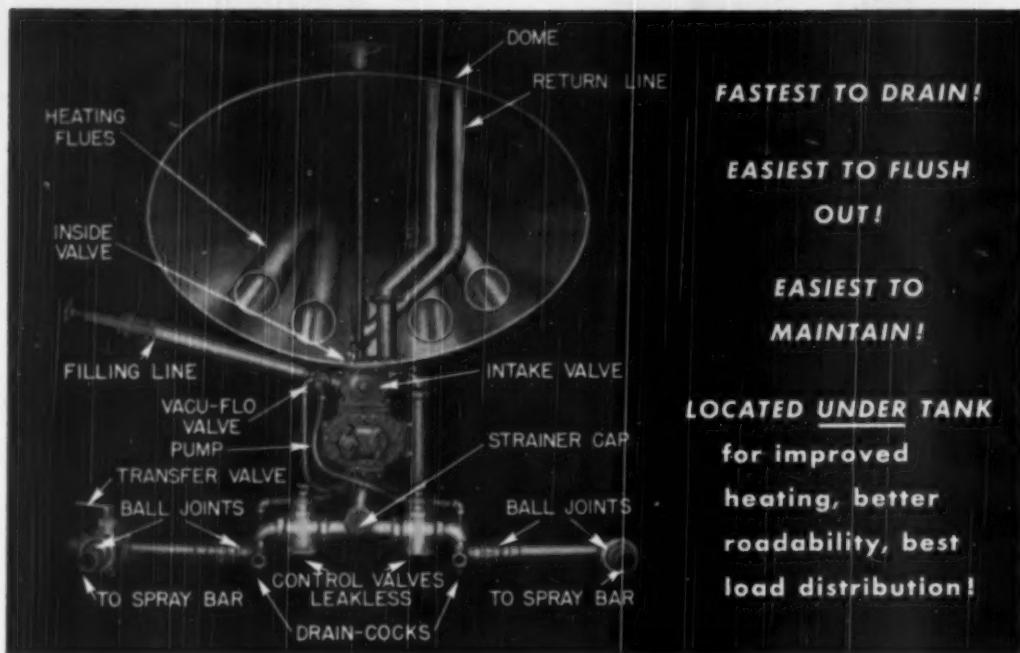


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Only ETNYRE has this remarkably compact, patented Circulating System



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Also, because the circulating system is *under* the tank, it is protected against damage from collisions or other accidents and permits a lower center of gravity for improved roadability, a better design of tank and more efficient heating.

Flanged or union connections are used throughout the system, permitting the replacement of a part with-

out tearing down the entire system. This arrangement also permits the taking up of loose connections without strain on other members.

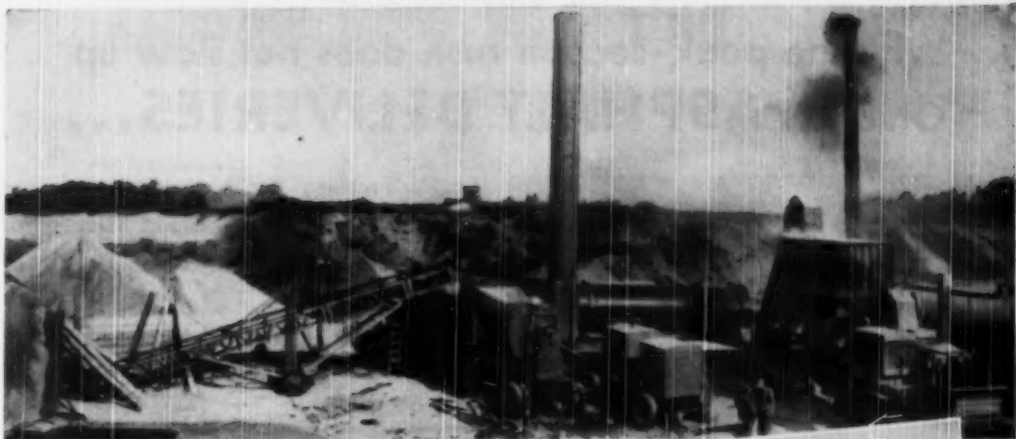
This unit is easier to clean and can be drained completely. Only material which adheres to walls must be washed out. Just three quarts of flushing oil are needed to wash out pump, spray bar, valves, strainers, and lines. Wall area is smaller due to compact design, thus requiring less flushing oil. In every way, during every day of operation, Etnyre users save material, time, flushing oil, dead weight!

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 BITUMINOUS DISTRIBUTORS





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● How would you like a big asphalt plant that you can set up in a few hours . . . one in which all mixing operations are fully automatic?

Now, you can get these two important features . . . plus many more . . . in a plant that produces 100-150 tons of material an hour. It's PIONEER's Continuous Process Asphalt Plant.

This big plant consists of only three main units, the mixer and the dryer and the dust collector. Each is a complete unit mounted on its own pneumatic tired truck. It's the most portable large asphalt plant ever built.

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If you're going after big black top jobs this year, better get full details about PIONEER's Continuous Process Plant now. It can give you better material mixed to closer tolerances at lower cost per ton. Mail the coupon today for our new handbook.

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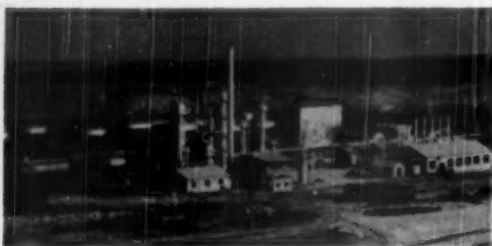
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Ample loading facilities and tank car supplies enable us to speed your order to you... without delay

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Flexible Base Widening

and Construction of Pavement Resurfacing

An exceptionally thorough and complete review of practice observed in typical states and recommended by the author

By Herman C. Helmle

District Engineer, The Asphalt Institute, Springfield, Illinois.

ASPHALT resurfacing of old pavements is not new. Even in the early 20's many maintenance engineers were using road-mixes and cold-lay bituminous mixtures for this purpose to a limited degree. Because of the durable and economical properties of these "home-made" resurfacings, various states began preparing specifications for more suitable asphaltic mixtures. Prior to 1935 twenty-three states had let their first contracts for this type of work while New York and Wisconsin had contracted their first resurfacings as early as 1920 and 1922, respectively. The asphalt resurfacing was used on old portland cement concrete pavements where subgrade settlement had occurred, where considerable deterioration occurred from "pumping," inadequate slab thickness or internal disintegration.

Many pavements built in the early 20's have been resurfaced and continue to serve traffic well. To give an idea regarding some of the pavement mileages involved, take for example the Highway Statistics for 1948 as published by the (now) U.S. Bureau of Public Roads. They show that on the existing mileage on primary systems and extensions of rural state highways and on secondary rural roads under state control there were

92,265 miles of portland cement concrete and 162,629 miles of asphaltic pavements consisting of sheet asphalt, bituminous concrete, bituminous macadam, and mixed bituminous construction. Moreover these mileages did not include similar mileages of pavements located in municipalities which are in various degrees of disrepair.

Since reconditioning of portland cement concrete pavements, due to rigid design and in many cases to narrow widths, offers more complexities than renovation of other types, the following discussion on widening and resurfacing will be restricted chiefly to this type.

Four Resurface Types

Resurfacing Types. Bituminous resurfacing throughout the United States may be classified under four general headings: surface treatments, road-mix type, hot-mix type, and composite types where granular lifts are constructed over the old slab before placing the hot-mix resurfacing.

The surface treatment types are constructed as double or triple surface treatments and range in thickness from $\frac{3}{4}$ to 1 in. They are frequently used where "scaling" or other objectionable surface blemishes are progressing. Due to construction difficulty they do not improve the riding quality of a slab very much; consequently, where this type of resurfacing is used the old pavement should still be fairly smooth and in good repair. Accordingly, surface treatments are limited in their use as a resurfacing type.

Road-mix mat type resurfacing is used where projects are small and do not justify the added costs for moving in a hot-mix asphalt plant. Since the road-mix type of resurfacing does not have the same resistance to movement under heavy traffic as hot-mix it is restricted to pavements where the volume of traffic is low. It should also be restricted to use where the old slab is in fair condition, with but few maintenance patches. This type of resurfacing varies in thickness from $1\frac{1}{2}$ to $2\frac{1}{2}$ in.

Hot-mix asphaltic resurfacing is used chiefly where the old slab is in a poor or critical condition, such as where it is rough or where excessive pumping or internal disintegration has occurred. This type of resurfacing varies in thickness from 2 to 3 in. In many cases, however, where pumping slabs have not been undersealed or where numerous maintenance patches of questionable strength are not replaced with suitable material, the thickness of resurfacing may be increased to as much as 5 or 6 in. Hot-mix asphalt concrete is used chiefly in this type of construction because of its high resistance to displacement under traffic, but sheet asphalt has been used to some extent where good sand is cheaply available.

Granular Lifts

The type of resurfacing which requires a granular lift or base is used where it is desired to correct low grades, where the subgrade has settled badly, where the old slab is in a critical condition, where rocking slabs are encountered, where maintenance patches of questionable stability are so numerous that it would be uneconomical to remove them and where there is some question as to whether the old pavement should be replaced.

★ Compacting a 3-ft. asphaltic concrete base widening with a trench roller in Iowa



The thickness most frequently used for a granular lift is 6 in., with another 3 in. for the hot-mix asphaltic concrete surface course. Where subgrade settlement has been excessive and where suitable aggregates are easily available at low cost these granular lifts have been constructed 8 and 9 in. thick.

Preparing Slab as Base. Most asphalt resurfacing constructed today is the hot-mix asphaltic concrete type where resurfacing is placed directly upon the old slab. Before placing the resurfacing, it is essential that (1) all cavities under the slab (which develop chiefly from pumping) be corrected by undersealing, and (2) all rocking slabs and maintenance patches of questionable stability be removed and replaced with suitable patching material to at least the full depth of the old slab.

For undersealing, a number of states, including Ohio, Texas, Missouri, and Illinois, are using an asphalt cement having a high softening point and low penetration because of the excellent results obtained as well as economy. Asphaltic concrete is being used extensively also as a base patching material since its cost per unit of volume is about the same as other suitable base materials while in addition all excavations may be filled and used during the same day, thus eliminating extra costs for numerous barricades and lights and lessening restraint to traffic.

Where old pavements contain wide cracks or joints which have been filled with asphalt such material should be removed and replaced with a fine graded asphaltic mortar mixture. Where patches are in place containing an excess percentage of asphalt they should be removed before resurfacing. If such maintenance mixtures are stable and contain about the optimum percentage of asphalt it is not necessary to remove them.

Economic Question

Where rehabilitation of an old pavement is being considered, it is a case of relative economy as to whether the amount of conditioning such as undersealing and patching will cost as much or more than 2 to 3 in. additional

asphaltic concrete or a 6-in. granular lift over the entire pavement before the new resurfacing is constructed. In most cases, however, if an old pavement is resurfaced before such a condition exists it may be salvaged at a moderate cost.

Widening Existing Pavements. Many of our pavements now in need of reconditioning are also too narrow for modern traffic. The Highway Statistics Summary to 1945 as published by the U.S. Public Roads Administration shows that our primary rural state system then contained 126,458 miles of pavement having widths of 16 to 20 feet. Minimum pavement widths of at least 22 to 24 ft. are today required, depending upon the volume of traffic. Consequently, in modernizing an old pavement, widening to a satisfactory width before it is resurfaced is also essential.

Many miles of these old pavements had an integral curb. In general these curbs were constructed to a height of 3 to 4 in. and with many engineers there is a question as to whether the curb should be removed before widening and resurfacing. Iowa is one state with many miles of this pavement design, and after considerable investigation engineers there have developed a machine for removing the curb [as described in March '50 *ROADS AND STREETS*]. This was accomplished during the past season in a very satisfactory manner at an average cost of only 5.96¢ per foot for removing 156,000 lin. ft. of curbing.

Case Examples

Ohio was one of the first states to investigate the use of asphaltic concrete for widening old pavements before resurfacing them. On account of its low cost and resistance to the development of a longitudinal crack in an asphaltic resurfacing adjacent to the junction of the widening and old pavement, asphaltic concrete base material has been approved in their widening and resurfacing design. Iowa (Fig. 2) and Missouri are using similar designs for asphaltic base widening.

In Arkansas and in the Mississippi river valley flood plain where numerous small bridges span drainage

ditches, a different base widening has been used (Fig. 1). Where the old pavement was in a critical condition and where, on account of the numerous bridges, a granular lift could not be used because the grade change should be held to a minimum, the Arkansas engineers approved a base widening and resurfacing design which required the removal of shoulder material on each side of the slab to a depth of 12 in. below the pavement surface. This was replaced with a 6-in. bottom course of sand and a 6-in. sand-gravel or crushed stone base course. Upon the old slab and extending over the granular base widening course for a width of 2 ft. was constructed a 5½-in. asphaltic concrete resurfacing.

The Minnesota highway department on much of its resurfacing requires a 6-in. granular lift over the old slab before it is resurfaced with a 3-in. course of asphaltic concrete. Where a pavement is widened the granular base widening extends to the ditch with a total thickness of 18 in., including the granular lift (Fig. 3).

Wisconsin frequently uses an 8 or 9-in. granular lift over an old slab and it also extends to the ditch (Fig. 4). On the widened pavement section a 3-in. resurfacing extends 2 ft. over the widened portion of the granular lift.

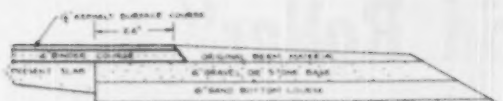
Even with these variable designs, these base widenings all give satisfactory results. There seems to be only a limited amount of longitudinal cracking in the resurfacing at the junction of the old pavement and the widened sections. It is evident, therefore, that the types of base widening to use depend upon the cost for the various materials. For example, where aggregates are exceptionally cheap, granular base widening constructed in combination with granular lifts should be used and where aggregates are expensive, asphaltic concrete base widenings should be used in a resurfacing program.

Construction Methods

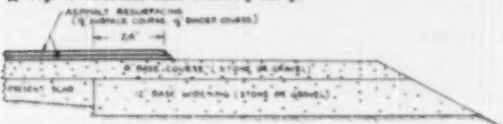
Construction of Base Widening and Granular Lifts. Where the trench system is used for the asphaltic base widening the excavation is usually made with either a (Buckeye) trencher or a motor grader equipped with a special blade. Where the bottom course of the widening consists of a rolled stone base the trench is constructed sufficiently wide so that the resulting base widening will have a 1 to 1 slope. If loose soil remains in the trench, it is removed and the trench is checked for proper cross-section. The subgrade of the trench is then

★ Special blade used on a motor grader for cutting a 3-ft. trench required in base widening in Iowa.

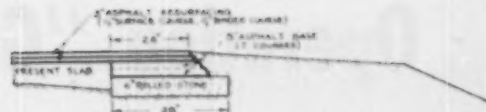




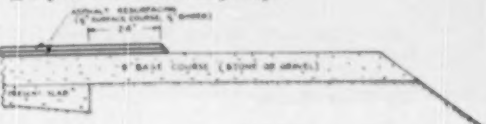
★ Fig. 1. Arkansas base widening design



★ Fig. 3. Minnesota base widening design



★ Fig. 2. Iowa base widening design



★ Fig. 4. Wisconsin base widening design

rolled with a trench roller until a satisfactory density is obtained.

Rolled stone used as the bottom course is generally moistened in a continuous mixer with the optimum amount of water before it is spread in the trench. The moistened aggregates are then compacted with a trench roller to a Proctor density of not less than 95%. If the aggregates are properly moistened this density is readily obtained. The surface is then primed with MC-0 asphalt, and when the prime is properly absorbed the asphaltic base widening course then is spread and compacted immediately. In compacting the asphaltic base widening material, approved trench rollers are used also for the lower courses. The upper course, however, may be compacted with a light tandem roller. Many of the states are requiring that the asphaltic concrete base widening shall be compacted sufficiently to obtain a density indicating not less than 95% of the laboratory density of the corresponding mixture.

Where granular base widenings are constructed in combination with granular lifts over the old pavement, such base widening is constructed sufficiently far in advance before the construction of the granular lift so that the maximum density is obtained either by construction operations or by traffic. Where granular base widening is constructed it is essential that the top 4-in. depth of the base widening material shall be compacted to 100% Proctor density at optimum moisture. Where the frost line is exceptionally low and where sand-gravel is used it is essential also that aggregates containing a high percentage of fines shall have a low plasticity index. Most northern states hold to a Plasticity Index of 4, while many of the other states permit a maximum of 5. Where gravels are used some of the states also are requiring that the total aggregates shall have not more than 15% of voids. In this case it may be essential to use up to 10% of soil, which, however, should have a very low Plasticity Index.

Hot Mix Overlay

After the granular base widening has been constructed and has been permitted to densify for a reasonable length of time, the granular lift is then constructed. In general, the same aggregate materials are used in the granular lift as those used in the widening and they are compacted sufficiently to obtain a 100% Proctor density at optimum moisture. To retain the optimum moisture, light applications of water with a distributor may frequently be necessary. When final blading and compaction are obtained the granular lift then is permitted to dry slightly. It is then primed with 0.30 to 0.50 gal. MC-0 per sq. yd. and is ready for resurfacing.

Where a granular lift over the old pavement is not required and it has been conditioned in a satisfactory manner as a base, it should be primed with 0.10 gal. per sq. yd. of rapid-setting asphaltic material. This is essential because it produces considerable adhesion and friction between the old slab and the new asphaltic resurfacing and, consequently, creeping of the hot bituminous mixture is prevented during rolling operations. Where the old slab is exceptionally rough and distorted a leveling course of asphaltic concrete should be constructed to correct irregularities. Where the resurfacing is constructed over a granular lift it is not essential to use a leveling course because during the grading and compacting operations a very smooth base may be obtained. Best results are obtained in resurfacing an old pavement when the resurfacing is constructed in two layers and has a total thickness of 2½ to 3 in.

To obtain suitable edge alignment a string line should be used near the edge of the pavement during the placement of the resurfacing and the outer edge of each lane of asphaltic mixture should be compacted to a slope of about 1½ to 1. If there is no excessive displacement under the roller, compaction should be obtained imme-

diately and sufficient rolling should be done to obtain a density indicating not less than 95% of the laboratory density of the corresponding mixtures.

With some asphaltic mixtures it seems difficult to obtain suitable joints at the junction of two lanes of the asphaltic resurfacing. This may be improved by carrying the screed of the finishing machine slightly over a previously constructed lane and slightly higher so that a small layer of mortar is deposited upon it. With the back of a rake mortar then may be pushed to the edge of the course being spread and compacted immediately. Generally such a procedure gives an excellent longitudinal joint.

Resurfacing Costs

Costs prevailing throughout the United States for hot-mix asphaltic concrete resurfacing vary considerably. In states where projects are small, costs generally are higher than where jobs are of a size sufficient to reduce overhead expense. The following (1949) prices, however, present reasonable costs per ton where considerable work has been done:

Hot Mix Resurfacing Cost Per Ton

State	Minimum Cost	Average Cost
Arizona	\$2.67	\$3.42
Arkansas	5.40	4.33
California	3.78	4.50
Georgia	6.97	6.78
Idaho	3.50	—
Indiana	4.81	6.21
Kansas	5.37	—
Massachusetts	5.43	7.96
Minnesota	—	4.15
Missouri	5.99	7.85
New Jersey	5.95	7.50
North Carolina	4.85	6.00
Ohio	5.26	6.96
South Carolina	5.90	—
Tennessee	4.50	6.60
Texas	—	5.40
Virginia	5.36	6.63

In some cases where an old pavement has failed badly and also has poor alignment, it may at first appear almost hopeless to improve the situation without complete removal of the old pavement. As funds are limited everywhere, however, more thought must be given to salvaging as much of the old pavement as possible.

(Continued on page 100)

Operation "Grid Roller"

Salvages Old Bituminous Streets

Substantial cost saving is indicated by the method outlined here

By Don Helm

Sales Promotion Department,
the Hyster Company

LOW-COST roads demand low-cost methods, as well as materials, and any process that will simplify the job of salvaging and resurfacing old bituminous surfaces is of vital interest to budget-conscious county and city road officials. Salvaging and resurfacing old blacktop up to the "laydown" stage by the customary methods is often an involved and costly operation. Heretofore this process of pulverizing has been done by track-type tractors, sheepsfoot rollers, harrows, discs and any other heavy equipment with sharp grousers or running surfaces. The old mat has to be scarified, the old material scraped up, run through portable breakers, hauled away to breaker mills or discarded entirely. And usually new aggregate has to be hauled in.

Similar problems were faced recently in Portland, Oregon, when a section of S.E. 136th Street was widened and resurfaced by the Multnomah County Road District No. 3. This salvage job was particularly unusual, not only because of a rebuilding and widening process involved, but because Multnomah County's assistant road master, Paul Northrup,

approved a comparative test of the conventional method and a new and unique one. He set aside two days for demonstrations so that visiting officials from Portland and adjacent counties could witness them.

This stretch of suburban road was not ideal for a comparative test, as it developed, but district superintendent Dick Shoemaker worked the road in sections so that beginning-to-end demonstrations could be made to each group of officials as they arrived on the scene.

136th Street is a high-crowned, narrow road with no shoulders, located in a rapidly-growing section of the city. It will carry an increasing amount of residential traffic. It was originally constructed of Gasco macadam, 18 ft. wide, with a mat thickness of 2 1/4 in. maximum and 2 1/4 in. average. Air temperature at the time of the test varied from about 65 degrees F. on one day to 45 degrees the next.

The problem faced on this particular job was not only to widen the road to 32 ft. including the shoulders, but somehow to make good use of the salvaged material in the process. The crown had to be cut down, the old mat scarified and pulverized, the subgrade bladed clean and the pulverized materials moved over to the shoul-

ders.

For the test, about .8 mile between S.E. Powell and Mall Streets was set aside for the conventional method, which involved the use of two motor graders with scarifier teeth and a smooth roller.

Test Job Described

A .5 mile section between Mall and Foster Road was allotted for demonstration of the new method. This part of the road was salvaged at the expense of Interstate Tractor and Equipment Company, using a Caterpillar No. 12 motor grader and towing a Hyster grid roller equipped with cleaners and approximately 3000 lb. of counterweight in the form of two solid steel bars strapped and welded to the grid roller. Total weight of the roller with counterweight was about 18,000 lb. Procedure was as follows:

Following normal procedure, the county's two motor graders made continuous passes over their section, scarifying the old blacktop, and then blading the salvaged material back and forth for the roller to pulverize. Then they bladed down to subgrade and pushed the salvage out to form shoulders. Eight hours working time was required on this section.

Using the assigned motor grader with five scarifier teeth and towing the grid roller, operator Dick Kirtland scarified, pulverized, graded and compacted the .5 mile section between Mall and Foster Road in 2.40 hours without losing any of the old material. On the first pass, the teeth were set at 4 in. depth. Two round trips scarified and grid rolled the entire width in 65 minutes (giving one pass over entire area). The second pass, made to further scarify and pulverize, was accomplished in 38 minutes with the teeth raised to dig 3 in. Next, the teeth were pulled up and the blade lowered. In one round-trip the motor grader pushed the windrows to either side and bladed down to subgrade. Then one pass was made down each windrow to spread the salvaged material, which by now had been reduced to fines. At this point most of the old material had been pushed out to form the new shoulders. The grid roller was towed during all these operations so that the pulverizing and compacting action was going on at the same time as the scarifying which eliminat-



★ Motor grader and grid roller start on the first round trip, scarifying and breaking up the original surface. Approximately 3100 lb. counterweight used on roller.



★ A close view of the road surface, scarified and grid rolled once. The five scarifier teeth were lowered to dig in 4 in. deep



★ The surface is already well pulverized after the second scarifying operation



★ The material is windrowed to both sides, leaving the sub-grade base in the center. A further pulverizing action by the grid roller is also accomplished during this operation as well as a compaction action on the sub-grade



★ The motor grader and grid roller resspread the windrows. During this part of the operation the blade of the grader shatters the larger chunks previously fractured by the grid roller, and the material is further reduced to fines as they pass under the grid roller the last time

ed separate compaction and pulverizing. Blading then distributed the material evenly and at proper thickness.

By towing the grid roller behind the motor grader over the scarified mat, the high pressure points of the grids fractured the large chunks being uprooted. Then, when bladed, the large chunks disintegrated at the point of fracture. "Screening" the windrows allowed the fines to sift to the bottom and also kept the larger chunks on top where the grid roller could go to work on them. By the time the salvaged material had been moved to the new shoulders about 95% of it was reduced to one-half inch or less in diameter, which is considered optimum for oil application. Because of the number of fines obtained, the salvaged material can be used for traffic while waiting for the oil crews, thus eliminating detours and barricades. Also the flow of traffic brings out some of the old oil, which is important to the engineer in charge in determining the amount of new oil to add.

The record low time in which these demonstrations were made, it should be mentioned, was accomplished because of the thin mat. The average time for such grid roller operations on a mat of 8 to 12 in. is one mile in 8 hours. On this demonstration Dick Kirtland easily drove the motor grader in third gear most of the time. In fact the photographer had to use a car to keep up with him.

Normal procedure for salvaging a road like this would be as follows: (1) scarify and pulverize; (2) repeat as often as necessary; (3) blade and windrow; (4) prepare subgrade; (5) (spread fines and compact; (6) roll with smooth roller; (7) apply seal coat. The grid roller is used in every step except the seal coat, and in cases where traffic is allowed on the road for several days before it is shot with oil, it is not necessary to smoothroll. Because this particular road had to be widened and the crown built up, it was necessary to add fill material. (Except in widening operations no additional material is usually needed when the grid roller is used, according to experience on other jobs.)

The nature of this particular job prevents an accurate comparison of figures; the county personnel computes yardage costs on an over-all average of the completed job; therefore, the following cost and performance data for the portion of the work up to the point of adding fill are based on best available averages:

In attendance at various times

Two Methods Compared—Approximate Estimated Figures

Old Method

2 motor graders* (with operators)	
66 5.50 per hr.	\$11.00
1 smooth roller (with operator)	3.25
	\$14.25

*County equipment is figured on a rental pool basis. Also taxes and insurance are not usually figured in cost of owning and operating government equipment.

Scarify and pulverize .8 mi. (8448 sq. yd.) 8 hours	
Cost per yard	\$0.155

Using New Grid Roller Method

1 Caterpillar No. 12 motor grader**	\$3.12
66 3.12 per hour	2.25
1 Operator	1.242
1 Grid Roller	
	\$6.612

**With taxes and insurance figured into cost. Also includes oil, maintenance and service costs, repairs, tires, etc.

Results

Scarify and pulverize .8 mi. (8508 sq. yd.) 2:00 hours	
Cost each yard	\$0.043



1 Before work started, the Carrier Mills Road through a small community was a series of potholes and broken surfacing



2 Caterpillar No. 12 motor graders scarified the old surface to 6 in. depth and windrowed the material



3 The Athey loader picked up the windrowed materials, feeding it in a steady stream to the towed portable breaker



4 The impact-hammers in the breaker evenly reduced the oversize material leaving a windrow



5 An Etnyre distributor gave the reworked material a thorough shot of oil



6 Motor grader blade-mixed the oil-shot material. The loader also demonstrated mixing ability

Surface Material

Reclaimed by New In-the-Road Method

COUNTY, state and municipal officials of southern Illinois were on hand, June 6, for a premiere showing of a new method of reclaiming road surfacing materials.

The method, utilizing the Athey Force-Feed Loader and Portable Breaker combination, was demonstrated on a blacktop road north of Carrier Mills, Illinois, and on a gravel road four miles west of Harrisburg, Illinois. The demonstration, arranged by the Fabick Tractor Co., Athey—"Caterpillar" distributor for the area, and Athey Products Corporation, illustrated the ability of the machines.

The vital need for equipment that could save roads that deteriorated so badly during the war has been very evident. Costs of resurfacing projects were prohibitive to some communities. Athey engineers have aimed at this problem in their equipment development. The Loader and Breaker team has been working on numerous jobs for some time, according to the manufacturers, but the demonstration on June 6th was the first formal introduction to the field.

The new method of reclamation starts with a motor grader scarifying and windrowing the old surface. Then the loader, which is a self-propelled windrow loader, picks up the windrowed material. The feeder design pushes even large, hard pieces into the loader belt. The material falls from the belt into the hopper of the towed breaker, passing through an impact-type hammermill. After reduction to the gradation desired, the material is ejected in even windrows to the rear of the breaker. Pick-up,

crush, and return-to-subgrade are accomplished in one operation, with the unit occupying only one lane on the road.

The reduced material is then given an application of oil, blade-mixed or re-run through the loader-breaker, spread and rolled into a new surface. Blacktop, gravel, or rock roads are refinished with equal adaptability.

The method eliminates transporting of materials to and from a central plant, as well as the expensive "hit-and-miss" reduction by discs, rollers, tracks and other equipment. The breaker is easily detached from the loader to permit the loader's application on other loading operations.

On the Carrier Mills Road demonstration, a strip 450 ft. long and 22 ft. wide was reworked. The old oil-mix surface was scarified to a depth of 6 in. Three 450-ft. windrows, averaging 3 cu. ft. per lin. ft., were formed. The material in each windrow, with oversize, including 3½-in. gravel boulders, was reworked in an average of 23 minutes—69 minutes for reworking the 162 cu. yd. in the whole strip. 65% fines were maintained. The same equipment on a section of gravel county handled 111.5 cu. yd. in one 37 minutes period of timing.

Interest among those present was centered particularly in the problems of thorough mixing and of oversize elimination, accomplishment of these two functions being fundamental to securing a well stabilized roadbed.

7 Spread and rolled, 450 lin. ft. of the old surface changed to a new smooth riding surface in 69 elapsed minutes



Non-Skid Surface Treatment

As Employed by the Michigan State Highway Department

Instructions from the "Bituminous Construction Sections" of the Michigan state highway department's Road Construction Manual. An excellent summary of good practice. Photos courtesy W. W. McLaughlin, Testing and Research Engineer.

THIS type of surface treatment, sometimes referred to as seal coat, is in general use on both construction and maintenance work in Michigan. Michigan state road specifications cover surface treatment by distributor application using various kinds of bituminous materials, followed by cover material application, in one or more courses. Surface treatment may be applied on gravel, macadam, concrete, brick or bituminous surfaces. The choice of materials and rates of applications depend on the purpose for which the treatment is intended.

Equipment Notes. The most important piece of equipment on this type of construction is the distributor. To expect good results, it must be in good condition and must meet all specification requirements. The tachometer for measuring forward speed may be calibrated in feet per minute or hundredths of miles per hour but a speedometer calibrated only in miles per hour is not sufficient.

Use of Drags

The drag serves the several purposes of uniformly distributing the cover aggregate; saving hand work;

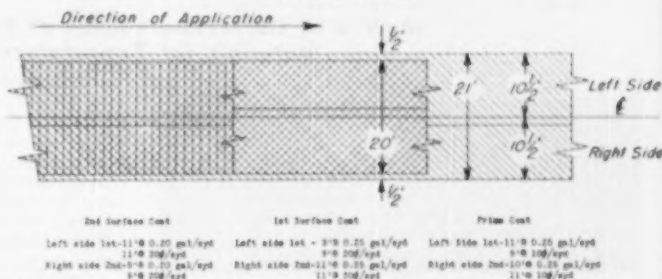
agitating the cover aggregate to help drying; and keying in the aggregate on successive courses. The wire chain-link fencing drag is generally preferred to the broom drag for the light courses applied in most cases by the Department. The heavier broom drags are designed for use with heavier applications and coarser aggregate. If a broom drag is used, it should be at least 14 ft. long and about half the width of the surface to secure uniform distribution of stone. There is also available a commercial wire tuft drag which has been very satisfactory. This drag is of lighter construction and has less tendency to tear the surface than the ordinary broom type.

The drag should never be pulled at a speed greater than 10 mph. Several trips are generally required to obtain satisfactory results.

A power broom shall be on the job before work starts. This broom will be required to sweep the existing surface, if such is a pavement, to dress up each surface course before subsequent application of the next course, and to retrieve cover material from the shoulder when it is displaced by traffic.

In general, it is a Department policy to have the Maintenance Division shape a gravel surface or patch and repair an existing surface in preparation for the surface treatment.

NON SKID SURFACE TREATMENT DISTRIBUTOR APPLICATION CONSTRUCTION SEQUENCE SHOWING LAP JOINT CONSTRUCTION PRIME & DOUBLE SEAL



★ Fig. 1. Sequence of construction operations for 20-ft. wide Class A treatment



★ Is the distributor in good condition? Does it meet all specification requirements? Applying stone on second half, 11 ft. wide



★ Immediately following a 10-ft. distributor pass. See article



★ Distributor should not be allowed to start until the contractor is ready to follow with a steady chip run

In shaping and preparing an existing gravel or macadam surface, particular attention should be paid to the removal of chatter bumps. It is not sufficient to cut off the tops of these corrugations and fill in the depressions. A base prepared in this manner might be satisfactory at first but the variations would inevitably show up in the final surface after being subjected to traffic. Whether the base is being prepared by the contractor or by the Maintenance organization, it must be approved by the district engineer before the prime coat is applied.

On bituminous and rigid surfaces

the project engineer must personally see that the existing surface has been properly cleaned, as provided in the specifications, before allowing the contractor to apply the bond coat or surface treatment.

Avoid Overheating

Heating Methods. Table, "Application Temperatures for Bituminous Materials," gives the temperature ranges for proper distributor applications. Usually, the temperatures should be well toward the top of each range to give a uniform spread, but this will

vary with the source of the material and with the air temperatures at the time of application. The distributor is required to have a thermometer and heating facilities. Use the thermometer and insist on necessary temperatures for good results. Any overheated materials should be rejected.

Preparation of the Cover Material.

The specification limit on moisture in the cover aggregates for application should be adhered to strictly. 3% has been set up as a practical limit but it should be realized that cover aggregates cannot be too dry.

Method of Correcting Volume of Bituminous Materials for Temperature

The bituminous materials will be measured by volume in gallons at a temperature of 60° F.

$$V = \frac{V_1}{K(T - 60) + 1}$$

where V = volume at 60° F.,
V₁ = volume at observed temperature,
T = observed temp. in degrees F., and
K = coefficient of expansion.

Coefficients of Expansion (K)

Material	Specific Gravity 60/60 F.	Coefficient per degree F.
Asphaltic Products	0.850 to 0.966	0.00040
Asphaltic Products	Above 0.966	0.00035
Tars T-1 to T-4, incl.		0.00035
Tars T-5 to T-12, incl.		0.00030
also TCB-5 & TCB-6		

Asphalt Emulsions: The volume at the temperature of measurement will be considered as the volume at 60° F.

The specific gravity at 60°/60° F. will be shown on the laboratory reports.
Example:

Material, T-5	K = 0.00030
Observed Temperature	= 125° F.
Volume at 125° F.	= 850 gal.

$$V = \frac{850}{0.00030(125 - 60) + 1} = 834 \text{ gal. at } 60^\circ \text{ F.} = \text{Pay Quantity}$$

Formula For Calculation of Volume in Gallons From Weights

$$G = \frac{W}{S.G. \times 8.328}$$

where G = vol. in gal. at 60° F.,
S.G. = spec. gravity at 60° F. (Shown on lab. report), and
W = weight in pounds
8.328 = weight in lb. of 1 gal. water at 60° F.

Example:

W = 8000 pounds
S.G. = 0.980

$$G = \frac{8000}{0.980 \times 8.328} = 980.2 \text{ gal. at } 60^\circ \text{ F.}$$

Formula For the Calculation of Lineal Distance a Load of Given Weight Will Cover For a Given Width and Given Yield

$$\frac{L \times 9}{W \times Y} = \text{Lineal Feet Covered}$$

where L = load weight in lb.,
W = width of application in ft., and
Y = yield in lb., per sq. yd.

Examples:

- (1) 9000-lb. load to be spread at a rate of 25 lb. per sq. yd. for a 10-ft. width

$$\frac{9000 \times 9}{10 \times 25} = 324 \text{ ft.}$$
- (2) 10,000-lb. load, 22-ft. finishing machine, spread at 150 lb. per sq. yd.

$$\frac{10,000 \times 9}{22 \times 150} = 27.27 \text{ ft.}$$

Sequence for Prime Seal and Double Seal. The construction method for placing Non-Skid Surface Treatment, Class A, includes six operations; 3 applications of bituminous material and 3 applications of cover aggregate for each half road width. The following sequence of operations has been designed to permit through traffic at all times, with a minimum of risk to the motorist and with the least risk of damage to the fresh seal coat. This method provides for a lap joint along the center joint on all applications to eliminate failure at this point. Fig. 1 shows graphically the sequence of operations for a surface treatment 20 ft. in width.

Starting on the left side of the road, facing the direction of application, one distributor load of prime material is applied 11 ft. in width to the left half of the road. This is immediately covered with the first course of cover aggregate 9 ft. in width. Traffic may now use this half of the road while the distributor is moved back to the starting point and a second load of prime is spread 10 ft. in width on the right side of the road. This is followed by an application of cover aggregate 11 ft. in width.

During priming operations the distributor is permitted to apply the entire load without waiting for the chip spreader. However, the second load of prime cannot be applied on the other side of the road until the first load has been covered with aggregate.

Prime Day Ahead

Only that portion of road shall be primed in one day which can be treated with the first surface coat the following day. This will require carrying traffic over a section of road on which the entire surface has been primed, and will necessitate drastic traffic control. It will be necessary to have a barricade at each end of the primed section, and to have flagmen on the job at all times, who will definitely slow down the traffic and give warning of the condition of the barricaded section of road.

The next operation is the application of the first surface coat of bituminous material. The contractor must have both prime material and surfacing material on hand before starting this work. Starting at the beginning, again on the left side of the road, the surfacing coat is applied 9 ft. in width over the top of the prime. This is followed with cover aggregate 9 ft. in width. A second load of surfacing coat is then applied 11 ft. in width on the right side of the road on top of the first load of prime, and this is followed with cover aggregate 11 ft. in width. We now have the first application of surfacing material and cover aggregate 20 ft. in width.

There is no definite mileage or time limit specified between the first surface coat and the second or final surface coat. Depending upon circumstances and instructions from the engineer, the first coat may be placed 5 to 10 miles or for a period of 3 to 4 days before applying final or second surface coat. It is to the contractor's advantage to keep on hand a supply of the final cover aggregate. In case work is stopped by rainy weather, he would be able to start applying the second surface coat sooner than he would be able to resume operations on the gravel surface, because a sealed surface would dry out much sooner than a gravel surface. The second or final surface coat should be applied in the 11 and 9 ft. widths to provide for offset joints as indicated on the sketch.

Curing Important

Bituminous Prime or Bond Coat. Bond coat is seldom used in conjunction with a surface treatment on an existing pavement but the use of a prime coat on a gravel surface is an important operation. The surface must

(Continued on page 95)

**low cost,
accurate
and fast!**



Self-propelled — 4 wheel drive.

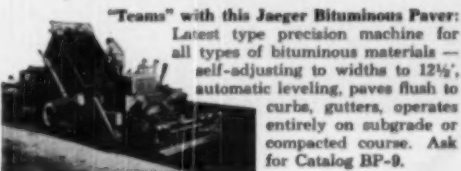
Operates entirely on subgrade — no displacement of newly-spread materials. Blends joints.

Lays up to 9" thickness, up to 12½' width, with straightedge accuracy.

All base and surface aggregates, plant-mixed stabilized soil or free-flowing bituminous mixes.



So low in cost you can use two spreaders in tandem to lay full width base, roll in one operation, keep your higher-priced paver busy laying top course — at tremendous saving. Ask for Catalog SPS-9.



"Teams" with this Jaeger Bituminous Paver:
Latest type precision machine for all types of bituminous materials — self-adjusting to widths to 12½', automatic leveling, paves flush to curbs, gutters, operates entirely on subgrade or compacted course. Ask for Catalog BP-9.

THE JAEGER MACHINE CO., Columbus 16, Ohio

Leading distributors in 130 cities of the United States and Canada sell, rent and service the Jaeger equipment listed below.

**PUMPS • MIXERS • HOISTS • TOWERS
CONCRETE and BITUMINOUS PAVING MACHINES**

The Most Flexible Black Top Paver

on the market!

THE machine that is going to make possible the handling of the widest range of contracts is the one that is going to mean the most profit for you.

The flexibility of the Adnun Black Top Paver can't be equalled by any other piece of similar equipment. Your Adnun will lay any asphalt mix—hot or cold. It will spread stone, cinders or slag. It will lay soil cement. It has laid widths up to 13 ft. or it can spread narrow strips down to 6 ft.

In combination with the block-off sections of the hopper and the fine adjustment on the cutter bar, the Adnun will build out shoulders and "feather" the material into the existing crown without destroying the contour of the road.

This is a combination of advantages no other Black Top Paver can give you. They equip you to handle more work and a greater variety of work. Let our Sales Agent give you more details.



Look at this picture. Feathering a new shoulder into the crown. Adnun is the only machine that can do this.



Rubber Tired Stone Attachment makes a real stone spreader of the Adnun.



DO YOU POUR CONCRETE?

You can save money with the Direct Pour and the MultiFoote HighLift Boom. The MultiFoote Paver, equipped with the HighLift Boom will eliminate a crane, elevator, ramps and false work.

THE FOOTE CO., INC.

Subsidiary of Blaw-Knox Co.
1936 State Street, Nunda, New York

Application Temperatures for Bituminous Materials

(For distributor application only)

Design	Deg. F	Design	Deg. F	Design	Deg. F
T-1	60-125	TCB-5	60-120	MC-5	225-275
T-2	60-125	TCB-6	60-120		
T-3	80-150	RC-0	80-125	SC-0	50-120
T-4	80-150	RC-1	80-125	SC-1	50-120
T-5	80-150	RC-2	100-175	SC-2	150-200
T-6	80-150	RC-3	150-200	SC-3	160-210
		RC-4	175-250	SOA	300-350
		RC-5	200-275	LOA	300-350
T-7	175-225				
T-8	200-225				
T-9	200-225	MC-0	50-120	AE-1	60-125
T-10	200-250	MC-1	80-150	AE-2	60-175
T-11	225-250	MC-2	150-200	AE-3	90-125
T-12	225-250	MC-3	175-250	AE-4	60-125
		MC-4	200-275		

(Continued from page 93)

be properly shaped before priming as no corrections can be made afterwards without damaging the prime coat. The surface should be dry so that the prime material will penetrate. Some trouble has been experienced with extremely dusty surfaces, causing the prime to ball up with the dust, but more trouble has arisen from priming surfaces which were too damp. The curing of the prime coat is important. Any surface coat applied over an uncured prime coat is fluxed by the prime material which causes endless trouble with bleeding.

The cover aggregate applied to the prime, on projects where traffic has to be maintained, is merely to prevent spattering on vehicles travelling over the prime. It is neither dragged nor rolled. The minimum curing time in the specifications applies during hot, dry weather. Do not hesitate to require a greater time during cool or humid weather when needed. Remember that poor drying weather is also poor curing weather. When prime coat is fully cured it ceases to be tacky. With experience you will be able to tell whether curing is complete by the amount of stone which is picked up by your tires and thrown against the fenders as you drive over it.

Application for the Surface Coats. The important requirement in all distributor work is uniform application at the required rate. The rate of application will be shown on the plans or in the proposal for each project. If you do find that the distributor or operator are not capable of properly controlling the uniform application of bituminous material, stop the work and notify district engineer.

It is general practice to turn the last nozzle on the shoulder side of the spray bar to fan the material parallel to the centerline of the road to give a more definite edge. This is not done on the centerline side where fanning in normal position allows for slight overlapping and better blending with the adjacent application.

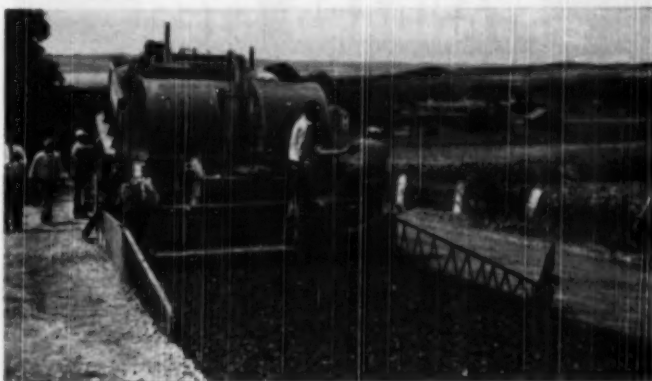
Weather conditions and the size of the distributor will govern how much of the first or second surface coats

that can be applied without having to hold up to wait for the chip spreading operations to catch up. Under normal

conditions the distributor should be able to empty the entire load if the chip spreading operations are well organized. The two operations should be kept within 1000 ft. of each other so that the applied material will be covered before it has cooled excessively.

Cover Application

Placing the Cover Material. The Inspector must not allow the distributor to start until the chip spreader can follow with a steady supply of cover aggregate. Two chip spreaders are required for the two widths of cover material being applied. For a 20 ft. surface treatment it is neces-



Moto-Paver

Speeds the Job—Cuts the Cost



A Versatile, Flexible Machine

The Moto-Paver is a versatile, flexible machine. Aggregate may be dumped directly from trucks into the Moto-Paver hopper, as shown here, or picked up from a windrow by using an H & B Moto-Loader with the Moto-Paver.

The Moto-Paver makes road dollars go further, and do a better job, in less time. Especially on resurfacing and new construction on secondary roads and city streets. With the Moto-Paver a uniform, high quality bituminous mat is mixed and laid in one continuous operation. A smooth, waveless surface is produced, even when resurfacing over rough, irregular pavement. No other machine or method produces comparable results at comparable costs.

Moto-Paver uses beach sand, gravel, crushed stone or slag aggregates and various bituminous materials including tars, cutback asphalts, road oils and emulsions. Road speeds up to 25 miles per hour make it possible to move the Moto-Paver from one job to another in a minimum of time. Standard and heavy duty models for all kinds of operating conditions.

See your local H & B distributor or write direct for Bulletin MP-49.

HETHERINGTON & BERNER INC.

Engineers . . . Manufacturers

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INDIANAPOLIS 7, INDIANA

BITUMINOUS ROADS AND STREETS

Form No. 227

NON-SEED SURFACE TREATMENT
Material-Yield Record

Group 4B
No. 35-16, CE
Project 47-1, C1

(Check one)

Prime Course
1st Surface Course
2nd Surface Course

Stockbridge to Gregory (H-106)

Stationing	Date	Bituminous Material Gallons	Accumulating Gal./Yd	Cover Aggregate Tons	Lbs./Yd.
Sq. Yds.	Prime Coat				
255/00 - 95/00	9/10	9,780	.282	199	10.2
95/00 - 00/00	9/11	18,082	.251	336	11.1
	First Seal				
106/00 - 185/00	9/12	2,860	.261	108	18.2
185/00 - 285/00	9/13	9,700	.251	336	19.3
0/00 - 106/00	9/16	14,600	.253	667	19.4
	Second Seal				
285/00 - 106/89	9/16	6,650	.196	406	23.9
106/89 - 0/00	9/17	11,450	.20	679	23.7

STANDARD STEEL PRESSURE DISTRIBUTOR

FOR
PRIME COAT

ROAD MIX

FOR
SEAL COAT

PATCH
WORK

**FULL CIRCULATING SPRAY BAR
GIVES UNIFORM SPREAD OF MATERIAL
THROUGHOUT LENGTH OF BAR...**

**SIMPLIFIED PIPING PERMITS
FAST LOADING AND LAYING...**

✓ 25% More Asphalt shot per day! Faster loading! No delays Starting! Instant cleaning at end of run! These are facts known to every operator of **Standard Steel Pressure Distributors**. Why? Because of the simplified piping in this equipment! The full circulating spray bar contains submerged valves which are quickly heated and remain uniformly hot at each point of pouring. The throw of a single lever opens and closes all valves instantly. Every inch of the spray bar delivers precisely the same material output—lightest or heaviest bituminous material. And there are 12 other special features that make this equipment outstanding in performance. Write for catalog 424 today for complete details.

OTHER PRODUCTS

Maintenance Distributors, Tor
Kettles, Patch Rollers, Supply
Tanks, Tool Heaters, Asphalt
Tools, Street Flushers, Construction
Brooms.



PD 3

Standard Steel Works, NORTH KANSAS CITY, MO.

sary to have a 9-ft. and an 11-ft. spreader. The truck and spreader should travel at a steady continuous rate of speed without excessive stopping and starting, to provide a uniform rate of application.

Dragging follows immediately behind spreading to eliminate irregularities and evenly distribute the cover material before rolling.

Two rollers follow immediately behind dragging operations to embed the aggregate into the soft bituminous material and to key it together and should operate within 500 ft. of the spreader. As one rolling is sufficient to embed the material, additional rolling tends to crush the stone and does more harm than good.

Before each subsequent application, excess cover material that has been disturbed or whipped off the road by traffic should be swept back on and again dragged to insure uniformity and smoothness.

The final spread of cover aggregate should leave a slight excess on the surface to allow for consolidation by traffic and to absorb bituminous material. As provided, areas having deficient or excess cover material must be corrected.

Control of Joints

Care must be used in the construction of longitudinal joints where half widths of the road are treated. Deficiency of bituminous material at the joint causes a tendency to ravel, and overlapping provides an excess which may cause bleeding. When starting or stopping the distributor the same considerations apply to transverse joints. It may be necessary, to prevent lean or fat places when starting or stopping, to lay building paper for about 5 to 10 ft. at the starting and stopping junctions so that the full distributor flow will start and stop at a definite time.

It is well to require a squeegee to be carried on the distributor so that any accidental excesses can be removed from the surface. A squeegee can be constructed by attaching an old piece of belting to a board approximately 24" x 4" x 3/4" with the belting extending 1 1/2 in. below the board to provide a flexible edge. The squeegee should be provided with a suitable handle.

In the control of longitudinal joints, 4 to 6 in. of width adjacent to the centerline or subsequent application, should be left bare during each bituminous application, and the cover aggregate should be applied over this strip with the next cover application. Care should be taken that traffic or dragging operations do not drag cover aggregate over this 4 to 6 in. strip be-

fore the next bituminous application is made. The purpose of this procedure is to prevent a lapping of the cover material over the joint which causes lamination and ravelling.

Maintaining the Road. Each completed section should be maintained for several days, when necessary, by subsequent dragging, and brooming of displaced cover aggregate on to the surface to insure bonding as much aggregate as possible into the surface and to produce a uniform mat. After cover material has been whipped from the road to the shoulder it will be necessary to use a power broom to bring it back. A drag is not satisfactory for this operation.

If, due to cool or damp weather, it appears that additional brooming and dragging would be desirable, after the surface has been accepted, the project engineer should notify the district maintenance engineer.

Approaches. Any extra work involved in sealing approaches at intersections will be incidental to the regular pay items. Such approaches shall be carried back 30 ft. from the centerline unless the side road is paved with hard surface or black top, in which case the surface treatment shall be carried to meet such surface.

How Much Bitumen?

Checking the Application. When bituminous materials are heated there is an expansion in volume. Plan quantities are based on the standard temperature of 60°F. When bituminous material is applied hot this expansion must be taken into consideration. The formula described in this article may be converted to the following form for computing the volume at the application temperature:

$$V_1 = V [K (T - 60) + 1]$$

If the application rate is 0.25 gal. per sq. yd., and MC-5 is being applied at a temperature of 200°F, this correct volume per square yard would be computed as follows:

$$V_1 = .25 [.00035 (200 - 60) + 1] = .262 \text{ gal. per sq. yd.}$$

The operation of a distributor for proper application is based on a constant pump speed to deliver a constant output in gallons per minute. The speed of the distributor is computed in lineal feet per minute for a given spray bar width, so that the material is applied at the proper rate per square yard. If the tachometer calibration is in hundredths of miles per hour it may be converted to feet per minute by using the equation: 1 mph. equals 88 fpm.

The following formulas govern calculations in checking a distributor.

To check a distributor, have the contractor or his operator make his

$$(\text{Total gals. applied}) \times 9$$

$$1. (\text{Rate per sq. yd.}) = \frac{(\text{Lin. ft. Covered}) (\text{Bar width})}{9}$$

$$2. (\text{Pump Capacity in gal. per min.}) = \frac{(\text{Speed in lin. ft. per min.}) \times (\text{Bar width}) \times (\text{Rate per sq. yd.})}{9}$$

$$3. (\text{Speed in lin. ft. per min.}) = \frac{(\text{Pump Capacity in gal. per min.}) \times 9}{(\text{Bar width}) \times (\text{Rate per sq. yd.})}$$

own speed and pump settings for a given application. Ride the distributor and collect the following data:

Operator's speed in feet per minute (from Tachometer), pump speed in R.P.M., spray bar width, rate of application in gal. per sq. yd., length of run

in lin. ft., and gallonage used in run. A gauge stick, usually furnished with the distributor, should be used to obtain the gallonage of the run as the float gauge indicator on a distributor is not sufficiently accurate. If no gauge or outage stick is available it is better

it pays off

APSCO BASE PAVER

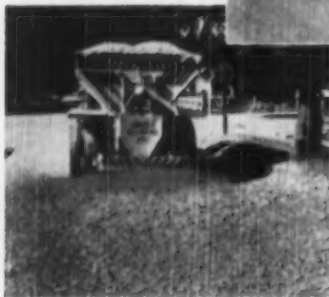
This self-powered, "dump-truck pushing" paver can easily handle 160 tons per hour. It's APSCO's newest paver—incorporating years of designing and field experience. Oscillating, leveling screed accurately controls depth, banking and crown. Adjustable spreading width. Practically no hand labor! Get further details—write today!

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U.S.A.

BLACK TOP SURFACING MADE EASY

With HI-WAY Model "R" in action—at right.



HIGHWAY Model "E" Spreader—Spreads small rocks, chips and gravel for surfacing and shoulder maintenance. Used to stop bleeding on black top.

Designed for dust control with calcium chloride in economy or for spreading sand and cinders in winter. Covers full width of 2 or 4-lane highway in one operation. Operates forward or reverse; all controls within reach of driver's seat.

Available: 8', 9', 10', 12', 14'—widths.
Four pneumatic traction tires 8', 9', 10' widths.
Six pneumatic traction tires 12', 14' widths.

HI-WAY Model "R" Spreader—Saves time, labor and material. Fast, accurate operation. Spreads chips, rock, gravel smoothly—no kick or thin spots. Ideal for seal coats on oil.

Operates forward or reverse simply by shifting lever. Adjustable feed gate controls thickness of spread; width is adjustable from 1 foot to full width of the spreader. Entire unit balanced for quick, easy hook-up to truck.

Available: 8', 9', 10', 12', 14'—widths.
Four pneumatic traction tires 8', 9', 10' widths.
Six pneumatic traction tires 12', 14' widths.

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Write to us today about your
surfacing and spreading problems

Manufacturers of the World's
most complete line of Spreaders

HIGHWAY EQUIPMENT COMPANY, INC.

405 D Avenue, N. W.

Cedar Rapids, Iowa

RIGHT FOR ROAD BUILDING

The Kinney Bituminous Distributor is an invaluable member of the road crew. With its famous Kinney Rotating Plunger Pump, this distributor delivers bitumen accurately as specified and you can always count on it to keep the job rolling smoothly. Grouped, rear-platform controls are specially designed for easy, positive action. Handwheel gives lateral adjustment of spray bar for matching bituminous strips. Fraco hot circulating spray bar can be furnished, as alternate, when desired. Write for Bulletin A-49, Kinney Manufacturing Co., 3537 Washington St., Boston

30, Mass. Representatives in New York, Chicago, Cleveland, Philadelphia, Los Angeles.



KINNEY Bituminous DISTRIBUTORS

to use a full tank quantity, even though it may require several runs to empty the distributor and an accumulation of the data.

By substitution in foregoing formula #1, solve for the actual rate applied; using this actual rate applied, and substituting in formula #2, solve for the pump capacity. In all subsequent operations the pump speed should be kept at this rate to give this pump capacity.

By using this pump capacity and substituting in formula #3, the speed in feet per minute can be found for any given combination of spray bar length and rate per square yard. Example:

A distributor with a 10-ft. spray bar and a pump speed of 200 R.P.M., traveling at a rate of 700 ft. per min., covers 3687 lineal feet while using 950 gal. of bituminous material. Determine the correct rate of speed for an application rate of .25 gal. per sq. yd.

Formula #1

$$\text{Rate per sq. yd.} = \frac{950 \times 9}{3687 \times 10} = 0.232 \text{ gal. per sq. yd.}$$

Formula #2

$$\text{Pump Capacity} = \frac{700 \times 10 \times 0.232}{9} = 180.5 \text{ gal. per min.}$$

Formula #3

$$\text{Required Speed} = \frac{180.5 \times 9}{10 \times 0.25} = 650 \text{ ft. per min.}$$

The operator should have driven 650 instead of 700 ft. per min. in order to apply at the rate of 0.25 gal. per sq. yd.

If the volume corrections for difference in temperature mentioned above is involved and .262 gal. per sq. yd. were required to obtain .25 gal. per sq. yd. application at 60° temperature, the computation would be:

$$\text{Required Speed} = \frac{180.5 \times 9}{10 \times .262} = 620 \text{ ft. per min.}$$

The pump should be operated slow enough to require low gear for the forward speed of the distributor during application. This will allow for a more constant forward speed regardless of grades and also be less hazardous to traffic.

Checking the Cover Application. There will be furnished for the Inspector a 25-lb. spring scale, small sample sack, and a 22-ga. sheet metal pan exactly 25.5 in. square by 1/4 in. deep, to check and control the desired weight per square yard of cover aggregate applications. The size of this pan will permit the placing of the pan directly onto the pavement in front of the spreader and allowing the

spreader and truck to pass over it. Doubling the weight of aggregate in the pan will give the poundage per square yard being applied. The Inspector should use this method to adjust the spreader at the start and to check it at intervals of at least every tenth load thereafter.

The Inspector shall also check the amount of cover aggregate being applied, by keeping a record of the truck loads and the distances covered.

Recording Quantities

Yield Records. A running record is to be kept on each Non-Skid Surface Treatment project and sent in to the Construction Engineer as soon as possible upon completion of each project. (Prescribed form). This record serves several functions as follows: to give the Project Engineer an idea of how the Inspector is coming out on final quantities, to give the Project Engineer a check on pay quantities and to give the Construction Office a record of the degree of control in the field. Unless this record is kept up to date and turned in promptly, it cannot be of full use in serving these purposes.

When is the Weather OK? The specifications provide that bituminous materials shall not be applied during

rainy or threatening weather or when moisture on the surface would prevent satisfactory bond. It is the Project Engineer's duty to watch weather conditions and control the work so that the quality will not be affected by taking undue chances. Reasonably dry conditions during and immediately after bituminous application are necessary for successful operations. When emulsions are used, slightly damp conditions before application are not harmful, but a rain on freshly applied emulsion which has not broken will tend to wash it off the cover aggregate or pavement surface.

When to Maintain Traffic? Where traffic is to be maintained by means of part-width construction, the Project Engineer should discuss in detail with the Contractor the most efficient way to handle traffic with safety. He should see that all necessary watchmen, signs, flares, turnouts or other provisions are taken care of before the work starts, and are continuously provided during the entire time of construction. Particular attention is necessary to have a sufficient number of warning signs marked "fresh oil" or "tar," so that the traveling public will keep off fresh bituminous materials. Criticism and possible claims against the Department

may be ensued if this is not carefully watched. The Contractor should not be allowed to get his work too far ahead on one side so as to greatly inconvenience traffic with long one-way driving lanes. If one-way traffic is necessary over sections involving hazards or insufficient sight distances with lack of shoulder turnouts, controlled one-way traffic with flagmen on each end both day and night, must be provided.

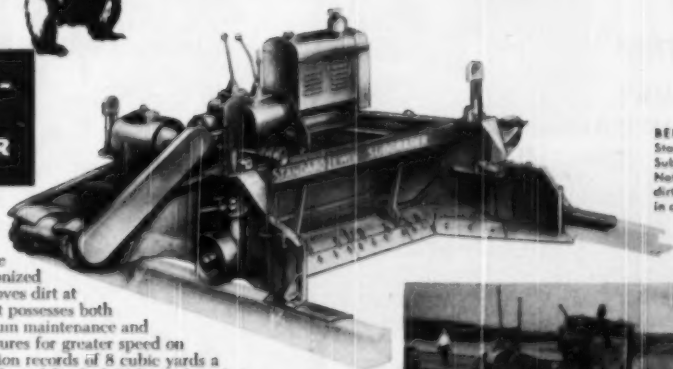
Method of Measurement

The responsibility of the Project Engineer in obtaining an accurate check on pay quantities cannot be overstressed. The Department has tried to impose on Contractors, through specification provisions, sufficient requirements for the measurement of quantities to give the Project Engineer exact information. Load weights are required on aggregates and tank car bituminous material quantities are checked by the Testing and Research Division and recorded at 60°F on the testing reports. Where other than tank car deliveries are made on bituminous materials, the Project Engineer may require distributor load weights. Some evidence of all quantities must be sent to the District Office with the final estimate.

A bear for work and punishment

STANDARD-LEWIS SUBGRADER

The STANDARD-LEWIS SUBGRADER can dish it out as well as take it—a real tough baby! This is the machine which has revolutionized subgrading in America. Moves dirt at unheard-of low cost because it possesses both rugged simplicity for minimum maintenance and unique, new engineering features for greater speed on the job. Has made production records of 8 cubic yards a minute and 12,000 lineal feet of finished 25 foot subgrade in 12 hours—without handwork or follow-up of any kind. Write TODAY for full descriptive literature, and the name of your nearest local distributor.



BELOW—The Standard-Lewis Subgrader in action. Note large volume of dirt being handled in one pass.



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EMBURY LITTLE AIR PILOT LANTERN

- Sturdy Compact Design
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- Easy to Light
- Burns 30 Hours on one Filling

ORDER FROM YOUR DISTRIBUTOR
For more AIR PILOT facts, write
EMBURY MANUFACTURING CO.

Flexible Base Widening

(Continued from page 87)

Partial Realignment

An example of such good engineering occurred during 1949 near Des Moines, Iowa. This was a 22.5-mile widening and resurfacing project. While at several locations abrupt change in alignment occurred, these were corrected by making five relocations and two grade changes yet involving a total length of only 2.86 miles of reconstruction. The new pavement consisted of the following design:

Roller stone base course	12 inches
Asphaltic binder course	2 inches
Asphaltic concrete surface course	1½ inches
Total	16½ inches

In most instances it has been proven that resurfacing an old portland cement concrete pavement is economical and increases the life of a pavement for many years. Take for example, U.S. Route 40 in Missouri. A 5-mile project was resurfaced in 1947 with a 2½-in. asphaltic concrete surface at a cost of \$20,000 per mile. This cost included a 9-in. crushed stone base widening constructed 3 ft. wide on each side of the slab. The following were the maintenance costs on this project before and after resurfacing:

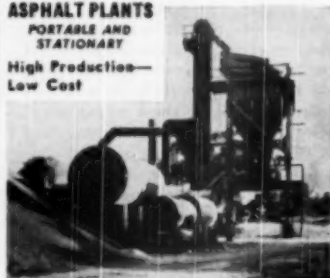
1944	\$1066 per mile
1945	911 per mile
1946	942 per mile
1947 (resurfaced)	149 per mile
1948	321 per mile

On an adjacent project which had not been resurfaced the maintenance costs during 1948 were \$3,500 per mile and during 1949 were \$7,000 per mile. This is one of the heavy-duty highways of Missouri and it is evident that while the resurfacing should have been constructed several years earlier it has saved the State a very large expense in maintenance, and this saving if amortized would far more than pay for the cost of improvement.

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PORTABLE AND
STATIONARY

High Production—
Low Cost



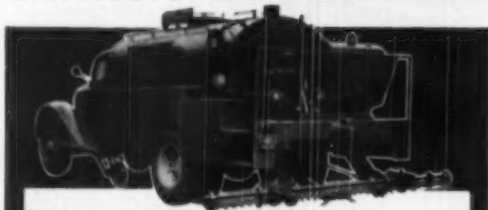
THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

For low cost operation

LITTLEFORD

"Spray
Master"

PRESSURE
DISTRIBUTOR



When it comes to spraying Bituminous Materials on Roads, Streets, Highways or Runways, there's no unit that can operate at a lower cost than the Littleford "Spray Master" Pressure Distributor. This unit with either a Standard or a Full Vacuum Flow Circulating Box up to 24 ft. in width can lay material on the Highway with 100% efficiency. Then too, there are no gadgets to take a lot of the operator's time turning them off and on; with a "Spray Master"—one valve starts and stops the spray. "Spray Masters" are made in models up to 4000 gallons in size. Make your next distributor the master of them all, the "Spray Master."

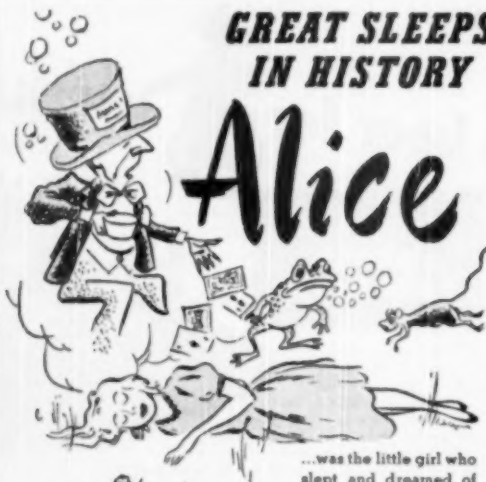


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IN HISTORY

Alice



...was the little girl who slept and dreamed of Wonderland. *Slumberland* is the favorite dream of over a quarter of a million guests who annually rest on those wonderful, cloud-comfortable beds at

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- ☐ 35 Other Trucks
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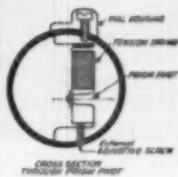
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Street Cleaning. During the year, 6,171 cu. yd. of paper debris, etc., removed from the streets. Cost for modern power sweeper was \$2.67 per cu. yd. Cost for hand removal, \$3.67. Total, \$20,287. A new flusher for use on streets and sidewalks is expected to reduce this expense.

A guide to airport owners and operators who are concerned with the many problems of turfing is available in the recently published CAA booklet, "Airport Turfing."

The new publication summarizes a wealth of knowledge and experience gained over the past few years at military and civilian airports, and through experimental work.

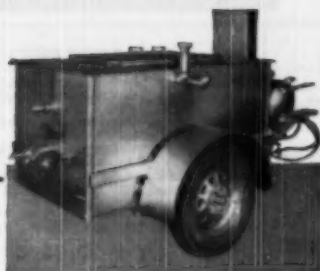
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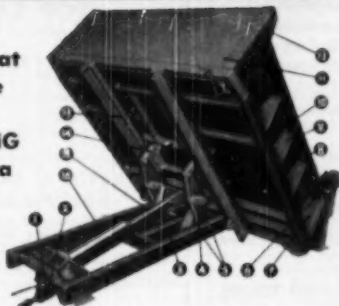
This low-slung tractor sticks on slopes steeper than 35°... mows over curbs from 1 1/4" to 10" high... travels up to 48 m.p.h. between jobs. Fast acting hydraulic lift controls sickle at angles from 45° down to 90° up.

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2510 W. Empire St. Burbank, Calif.
Stanley 72305

FOR SALE

- 2 D8 Caterpillar Tractors late LH Series with Model F.P. LeTourneau Scrapers.
- 1 D8 Caterpillar Tractor LH Series with LeTourneau Dozer.
- Cats may be bought separately from Scrapers and Dozer: \$16,000.00 takes the three equipped with D.D. P.C.U.'s, Lights and Generators, Pull Hooks and H.D. Radiator Guards. These Cats are in good shape.

R. C. VAN HOUTEN & SONS
BOX 486
LEMMON - SOUTH DAKOTA
PHONE 23

Equipment Values!

Tractor—Caterpillar Diesel B7, serial #374111, 1944 model, with brand new 7A dozer, Caterpillar front-mounted No. 24 CCU, new plow, craneboom stand, pull hook and 22" boom. Completely gone over, runs right. One of the best we have had. FOB Louisville \$3000.00

Motor-Crane—Three-Lorain TL20, #16201; 600 Water-Crane powered by two Waukesha 6-cyl. gasoline engines and complete with crane-clam-dragline equipment, 30-ft. boom, fairleads. About 3 years old, looks like a new one. FOB Louisville \$12,500.00

Engine-Power Unit—Caterpillar Diesel D1100Y, serial #184221—late model, complete except hood. Has been through our shop and put in 1st class shape. FOB Louisville \$1075.00

Tractor—Caterpillar Diesel B7 #787900. Ideal for all field work, being equipped with a LePlant-Chaste hydraulic inside mounted straight dozer and Hyter model B7N worm drive winch. Overhauled and ready to go. FOB Evansville, Ind. \$500.00

Water Grader—Caterpillar Diesel No. 10, serial #28554, with lining wheels, cob and last teeth. Time very good. Ready to work. FOB Louisville \$275.00

Tractor-Dozer—International Diesel TD18, serial #TD18612778H, with Holt CCU and hydraulic angle dozer. About 3 years old, has been carefully checked over. FOB Louisville \$5000.00

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SUPPLY CO.

400 W. MAIN ST. • LOUISVILLE, KY.
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LORAIN MODEL 41 SHOVEL, powered by GMC Diesel engine with electric starter. Mounted on crawlers. New in 1948. New guarantee.

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BUCYRUS-ERIE, Model TD-8 DOZER SHOVEL. New in 1948. In very good condition.

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In very good condition

5,000 SQUARE FEET

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Four Cat D. W. 10 with Laplante Chaste Scrapers manufactured in 1945 in good running condition and priced right.

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We have a fine assortment of Heavy Duty Truck-Tractors especially selected for your needs.

1947-Auto Car Model C-70-501 Cu. In. Motor, Air Brakes, New Short Block in Motor, Good Tires, New Paint.

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1946-Diamond T-614 Series, Detroit Motor, 2-Speed Axle, Good Tires, New Paint.

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Marion Model 471 Gas-Electric Shovel 1 1/2 cu. yd. rated capacity equipped with 2 cu. yd. shovel dipper. Waukesha 6-cylinder gasoline engine operating G.E. generator and motors. New 50' crane boom included. Where electric current is available in pit, quarry or dock, gas engine could be eliminated for low-cost operation.

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"Caterpillar" Diesel DW10 tractor with LaPlanch-Cheate scraper, reconditioned. DW10 Serial No. 1N2385, LPC scraper 248. Has gasoline starting engine. \$9,900.00.

International TD9 wide gauge Diesel tractor, 18' tracks, very good running condition. \$2,500.00.

Worthington 210 ft. portable compressor, "Caterpillar" Diesel D800 engine, four pneumatic tired wheels, reconditioned. \$2,000.00.

Blaw-Knox 1/2 yard clamshell bucket, size 472, Serial No. H-1024. Good condition. \$925.00.

Lima 1 1/2 yd. shovel, Model 750, Serial No. 1114, (1944) Shovel and 75 ft. Crane Boom "Caterpillar" D1000. Good condition. \$22,000.00.

Unit 1/2 yd. mounted on pneumatic tired wheels, new 1947 shovel and 30 ft. crane boom. Good Condition. Reasonable price. \$9,500.00.

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Lorain	75 A	2468	8000

Shovel	Model	Serial No	Price
Buffalo-Springfield		19338	4000
Buffalo-Springfield		15341	4000

Air Compressors	Model	Serial No	Price
Schramm	105	150625	1000
Schramm	105	150560	1000
Schramm	120	12528	750

Shovel	Model	Serial No	Price
Alfa-Chalmers	HD14	2592	6000
Alfa-Chalmers	HD14	2874	6000
Alfa-Chalmers	HD14	3083	6000
Alfa-Chalmers	HD14	3204	6000
Alfa-Chalmers	HD14	2412	6000
Alfa-Chalmers	HD14	2986	6000
Alfa-Chalmers	HD14	4261	6000
Alfa-Chalmers	K	8011	2000

Shovel	Model	Serial No	Price
Gardner, 515 Cable	HD14	1135	9500
Gardner, 515 Cable	HD14	1385	9500
Gardner, 515 Cable	HD14	1892	9500
Gardner, 515 Cable	HD14	4251	9500

(All Tractor & Dumper Factory calls)

Graders	Model	Serial No	Price
Alfa-Chalmers	AD	1/326	6500
Alfa-Chalmers	AD	1/326	6500

(Factory calls, heater, defroster, windshield wiper)

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Diesel centrifugal pumps 1000 GPM @ 280' head.

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2--Austin-Waters 2791 Motor Patrols, Good Rubber, Rebuilt Gas Engines, Enclosed Cabs & Lights \$3,500.00 ea.

1--11-5 Ransome Mixer, 2 pneumatic tires, Power Loader & Water Meas. Tank, Like New. \$1,000.00

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136	International TD18 w/ double drum power control unit. Excellent condition	7,900.00
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87	Fairbanks-Morse 3 beam wheel-barrow scale	146.00
96	Pow-r-wheel Barrow w/ extra flat bed—gas engine driven	275.00
98	Scoombobile—1 1/2 yd.—Excellent condition	1,200.00
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One Allis-Chalmers Model HD-14C Diesel Tractor equipped with electric lights and starter and Baker hydraulic Bulldozer with front mounted pump. Condition A-1 \$8,500.00

One Allis-Chalmers Model HD-14C diesel Tractor equipped with electric lights and starter and Le-Tourneau double drum Power Control Unit and push plate. Condition—very good \$5,500.00

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TRUCK CRANES

- 1—P & H with 80 ft. boom & 30 ft. lb. Ser. No. 5808.
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Excellent condition—perfect working order
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- 10—Model SLDT 25-yd. Euclid Bottom Dumps
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Also all types of miscellaneous construction equipment, including pumps, light plants, sheepshead rollers, compressors, air tools, water tanks, clamshell buckets, dragline buckets, transformers, poles, wire and reflectors.

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- 2—Super C Tournepelle
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Also large quantity of miscellaneous equipment, including concrete machinery.

All equipment subject to prior sale or disposition. Terms not F.O.B. cars, Denver, Colorado, or Enders, Nebraska.

FOR SALE**NEW**

- 1 Osgood Shovel — Type 100 — Model 1000 Serial 5759—4 1/2 Yd. Dipper—Caterpillar D-17000 Diesel Engine
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USED

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Hyster Hystoway Model HW with one-half cu. yd. Ecco dragline bucket with attaching brackets for mounting on Caterpillar D7 or D6 tractor, with 30' boom. Unit has been operated very little. Excellent condition.

F.O.B. Dallas.....\$3000.00

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1st. T-D-40 Diesel with Hoxymus Erie Bulldozer \$1,475
Also Caterpillar D4 wide gauge tractor with hydraulic dozer \$3,250.00

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Model 234 Digging Clamshell Weight 4500#
Has Teeth And Jacket Condition New Only
Used On One Job Bargain Price

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Diesel Engine, 8 Cylinder, 10 1/2" x 12" stroke, 600 RPM, Model 80, late type. Rebuilt.

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- 1—Link Belt Backhoe Model LS40 serial 807, rebuilt
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- 1—Fuller-Kinyon rotary compressor
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FOR SALE

- 1—Used Buckeye Model 120 Ditcher equipped to dig 11'-6" deep, 24" and 36" wide, with new type inserted bucket teeth. Powered with Buda 650 HP-124 Engine S/N 281810. Ditcher S/N 23. This Ditcher new in 1947 and had good care. Price as is, where is (Leeds) Sioux City, Iowa \$9,000.00
- Price with new belt and top working condition F.O.B. (Leeds) Sioux City, Iowa \$9,500.00
- 1—Used Buckeye Model 70 Dragline-Clamshell with 40 foot boom, Fairlead and Tagline, GMC Model 2-71 Diesel Engine and Fluid Coupler, 28" Track Pads and with ¾ Cu. Yd. Hendrix Light weight perforated bucket; S/N Machine 594. Machine has been used approx. 2000 hours. Very good condition.

Price F.O.B. (Leeds) Sioux City, Iowa
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Reason for selling: Company dissolved partnership

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Completely equipped with Double Drum Power Control Units and cable operated straight blades—also a few used units identically the same with 300 to 400 hrs. on them.

*Substantial Savings
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Contractor's Equipment

Distributor, Littleford Trail-O-Type, Model 3CTOD. Used 2 months, \$700.00.

Welder, P & H Model WG-300, \$750.00.

Galion 10 ton 3 wheel roller (new). Bargain.

Galion 5 to 8 Tandem Roller, new. Bargain.

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Galion No. 201 with cab, S/N G-23968A, Baker snow plow, 12' mold-board, one 2' end extension, lights, starter, heater, tandem drive, 9.00 front tires—90%; 13.00 rear tires—60%. F.O.B. Sioux City, Iowa \$3000.00

F.W.D. Truck, S/N 28953, with V-plow and wing, Model RV7-23, 10.00x20 12-ply front tires, 10.50x20 12-ply rear tires, 3-yd. St. Paul dump box, Model 559. F.O.B. Sioux City, Iowa \$1000.00

MISSOURI VALLEY
MACHINERY CO.
OMAHA, NEBRASKA
SIOUX CITY, IOWA

FOR SALE

42 joints class 250 B & S Cast Iron Pipe—\$1000; 42 joints class 150 ditto—\$1500; 17 joints Simplex Pipe—\$250; 1 Gardner-Denver 8½ Centrifugal Pump, Type D, 1000 GPM—\$700; 1 20x26 Welded Steel Pulley 1 15/16 Bore—\$40; 1 24x26 ditto, 2 7/16 bore—\$55; 1 20x44 ditto, 2 7/16 bore—\$80; 2 24x44 ditto, 2 7/16 bore—\$100 ea.; 1 30x44 ditto, 3 7/16 bore—\$125; 70" U. S. Giant 32 Oz. 8 ply 1/8x1/32 Conveyor Belt—\$500; 134" U. S. Giant 32 Oz. 6 ply 1/4x1/32 Conveyor Belt—\$1400; 1 42"x5" Link-Belt Self-contained Apron Feeder—\$500. All items are brand new, and are subject to prior sale. Prices are F.O.B. Piper, Ala. Contact

Shaw-Tutwiler, Inc.

at Piper, Ala., or 330 Brown-Mars, Birmingham, Ala.

FOR SALE

Barber-Greene asphalt plant, consisting of mixer, dryer, vibrating feeder, bucket elevator, and conveyor. Used very little and in excellent condition.

BERENZ & SON ASPHALT
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FOR SALE

- 1—Seamans Mixer, Model 48 inch width, Brand New. \$450.00
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GORDON LACKEY

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EQUIPMENT CO.**FOR BETTER BUYS**
IN USED EQUIPMENT

Shovel, Lima Type 802, 2-yd., 24' 6" boom, 18' dipper handle, standard crawlers, standard trend, powered with Caterpillar D17000 engine.

Conveyor, Barber-Greene Model 363, with 24"x35" cleated belt, powered with Wisconsin VET4 engine mounted on two 6.00x16 tires.

Tractor, International TD18 equipped with Bucyrus-Erie DD Power Control Unit and Wooldridge bulldozer.

Tractor, Minneapolis-Moline UTI with 8.25x20 front tires; single 14.00x28 rear tires.

Compressor, Chicago Pneumatic Model 46, mounted on 2 wheel trailer with 6.00x16 tires with pneumatic awivel wheel.

340 HOOVER ST. N.E.
MINNEAPOLIS
GLADSTONE 5931

FOR SALE OR RENT

ALL LATE MODELS

- 1—N.W. Shovel, 2½ c.y. Model 80D
- 1—N.W. Shovel, 1½ c.y. Model 6
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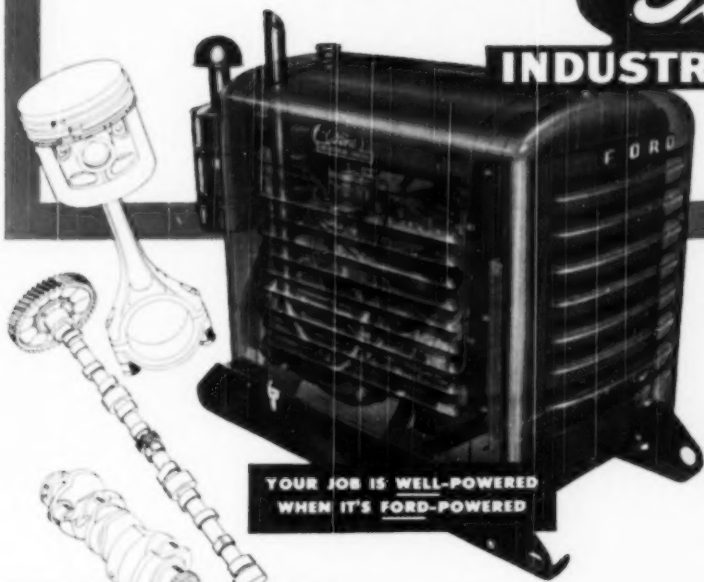
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*Kinney Mfg. Co.	24-25		
Koching Company	24-25		
Koth-Mfg. Company	24-25		

* Advertisers with * are represented in the 1945 edition of Powers Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.

For the **RIGHT** Features* specify



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6 cylinder, 254 cu. in. displacement
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Dearborn, Michigan

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Name

Street

City State



NORTH CAROLINA

(left) For this farm-to-market road, a plant-mixed Texaco Sand Asphalt wearing surface was laid over a sand-clay base.

MASSACHUSETTS

(right) A Texaco Asphalt Macadam pavement was constructed on a 12-inch gravel sub-base and 4½-inch sand-filled stone base for this superhighway near Concord.

When highway "specs" call for Asphalt - -

FLORIDA

(left) Heavy-duty Texaco Asphalt Concrete paving was used to widen and resurface 18½ miles of U. S. Route 1 near Jacksonville.



MINNESOTA

(right) Constructing a plant-mixed Texaco Asphalt pavement on 14 miles of State Highway 15, using pit-run gravel as aggregate.

roadbuilders the country over choose Texaco



TEXAS

(left) Texaco Asphalt Concrete paving plays important part in this State's program for by-passing traffic around the city of Austin.

SOUTH DAKOTA

(right) A 4-inch Texaco Sand Asphalt pavement is supported by a 6-inch stabilized sand-clay base on this section of U. S. Route 18.

Year after year, across America from Massachusetts to Texas and from Florida to South Dakota, road builders construct and resurface a substantial mileage of the nation's highways with Texaco Asphalt. This country-wide confidence was not earned overnight. It has developed gradually over a period of 45 years, during which road builders used and observed the performance of these asphaltic materials in thousands of road and street projects. They have noted the rugged durability and the low maintenance cost of Texaco Asphalt pavements on many of America's most heavily traveled arteries, under all kinds of climatic conditions.

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